

# JOURNAL OF THE American Veterinary Medical Association

FORMERLY  
**AMERICAN VETERINARY REVIEW**

(Original Official Organ U. S. Vet. Med. Ass'n)

EDITED AND PUBLISHED FOR

The American Veterinary Medical Association by Pierre A. Fish, Ithaca, N. Y.

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F. TORRANCE, J. R. MOHLER, R. A. ARCHIBALD

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ITHACA, N. Y.

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## THE FIFTY-FOURTH MEETING OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

The attendance and business done at this meeting amply demonstrated the desirability of continuing the professional and scientific activities of organizations during the war period. President Cotton's address struck the keynote to which much of the subsequent business was attuned. Its essence was patriotic service, helpfulness and high standards. It was constructive and progressive and drew merited applause.

The attendance ebbed and flowed, but at the opening exercises the seating capacity of the auditorium of the Kansas City Veterinary College was well taxed. In the absence of positive figures we would estimate that the total attendance was not far below that at Detroit last year. The meetings of the various sections were well attended; the papers were of timely interest and received adequate discussion.

At the business meeting, on the afternoon of the second day, the attendance was large, as matters of importance were under con-

sideration. Numerous minor changes to the constitution and by-laws were accepted, but the amendment relating to the lowering of the educational standard for entrance received some very heated discussion. The decision, however, was to retain the high school requirements as already indicated in the by-laws. The question will again be opened as two further amendments were presented; one to lower the requirements and the other to still further advance them.

The election for president disclosed the fact that a majority of the votes were cast for Dr. F. Torrance of Canada. Dr. R. C. Moore of Missouri and Dr. C. A. Cary of Alabama also received nominations for the office. As a neighbor and ally, it was felt by many that, with the prospect of international problems with which the association might be concerned, the experience of Dr. Torrance might be of material value. Perhaps, also, it was a recognition and testimonial, at this particular time, to the valiant service rendered by the allied veterinarians in the field.

Doctors Blattenberg, Haring, Jensen, Anderson and S. H. Ward were elected vice-presidents in the order named. Dr. A. T. Kinsley of Kansas City was elected to the executive board as member at large for a period of five years. Doctors Merillat and Schneider were re-elected as secretary and treasurer respectively without opposition. The secretary's report showed a larger number of applicants than ever before and the treasurer reported a satisfactory balance in the funds of the association.

Invitations for the next meeting were numerous and, in some instances, urgent. The claims of Philadelphia, Atlanta, Columbus, Estes Park and Madison were eloquently presented by their representatives. The evening was devoted to seeing the sights and a general good time at Electric Park.

The third day of the meeting was given over to an inspection of the Armour Packing Plant. This was a point of much interest to members and visitors alike. The transformation of live stock into finished food products and various by-products showed a wonderful system of efficiency and greatly impressed those who saw the machinery of it. Not least in interest to the veterinarians, was an extensive pathologic exhibit obtained from some of the thousands of animals slaughtered at the plant. An excellent lunch was served at the plant and all appreciated the generous hospitality. In the evening a patriotic program was arranged in the



ball room of the Hotel Muehlebach. The feature of the evening was an address by the Rev. Charles C. Russell of the National Security League on "Our War and World Peace". Mr. Russell has a son in the service of his country, and his remarks held a direct and personal interest to those present. In the absence of President H. J. Waters of the Kansas State Agricultural College, Dr. W. Horace Hoskins was called upon and, with his usual eloquence, gave an able presentation of the patriotic sentiments of the association.

The important feature of the fourth day's meeting was the organization of a relief fund for the allied veterinarians, including America. This fund is based upon the voluntary contributions of its members and includes the pledges of some of the state veterinary organizations. In less than an hour the sum of \$2775 was pledged. With further contributions coming in the next day, the total amount is well over \$3000. The committee in charge of this fund consists of J. H. Blattenberg, Ohio, Chairman; T. E. Smith, N. J.; W. G. Hollingworth, N. Y.; M. E. Knowles, Montana; and W. H. Dalrymple, Louisiana. To Dr. Blattenberg's active method of carrying on the campaign, the successful results are largely due. Such a worthy cause met with a sympathetic response. Those members not fortunate enough to be at the meeting may do their bit by forwarding their contributions to Dr. J. H. Blattenberg, Lima, Ohio.

Thursday evening's banquet was presided over by Toastmaster W. H. Dalrymple. The veterinarian of the North; East; West; South were responded to respectively by President-elect Torrance, J. F. Winchester, G. H. Glover and R. M. Gow. Dr. J. A. Kiernan spoke for the Bureau of Animal Industry and Mrs. F. H. Schneider for "The Ladies". Concise and appropriate remarks were presented by N. S. Mayo on the Live Stock Industry, to replace Mr. Lennon, who was unable to be present. Remarks were also offered by Dr. W. H. Coon of the Health Department. Captain Schwarzkopf was not present to respond to the toast: "The Army Veterinarian". Colonel A. Olver of the British Remount Commission, however, gave an entertaining talk on "Army Veterinary Service", wherein it was brought out that whereas the equine losses to the British in the Boer War amounted to 55 per cent, the losses in the present war had fallen to less than 10 per cent, because of the improved veterinary service.

It was rumored that a Ladies' Auxiliary to the association is to be formed and that they contemplate doing their share toward the Relief Fund.

The fifth day was devoted to the clinic in which was interspersed a considerable amount of business which had overflowed from the previous sessions, somewhat to the detriment of the clinic. The clinic was interesting and held a number of the members. A more complete account is reserved for later publication.

Abundant entertainment was provided for the ladies and they, as well as the members of the association, will carry away with them many pleasant memories of the Kansas City meeting and the generous hospitality provided by the local committee. Secretary Merillat deserves hearty congratulations upon the energy he has displayed and the effort he has shown to make the meeting a success. The number of applicants for membership has been unusually large and a new record has been established. President Cotton's efforts to emphasize the patriotic side of his administration and to maintain high standards for the profession, have borne fruit beyond expectations. For him no sacrifice has been too great, no duty too onerous where the good of the association was concerned. With his committee on Army Veterinary Service, he has given unstintingly of his time and effort for the good of the country and the profession. The clouds which obscured the question of rank for the veterinary reserve corps are beginning to break away. The sun of justice is beginning to shine through and the indications are promising that the veterinarians may receive the same recognition as is granted in the dental and medical corps. His administration has been marked by patriotic service; helpfulness, as shown by the organization of the relief fund and the maintenance of high educational standards. It has been a phenomenal year. The war, thrust upon us, has increased rather than decreased the membership. It has afforded an opportunity for a display of patriotism that has, perhaps, been equalled but not exceeded by other professional organizations. So far as the officers of the association are concerned, it has demonstrated that the right men have been in the right places.

P. A. F.

## EUROPEAN CHRONICLES

Bois Jerome.

**WILLIAMS' OPERATION**—It may be considered by some that all that could be said of the operation of Professor Williams has already been published and that it is comparatively of little advantage to again refer to the subject in the pages of our Journal.

Indeed the operation has been described over and over again, changes and modifications in the technic of the *modus operandi* have been presented, the results, the *sequelae*, etc.; everything has been criticized and made known; and yet, I may be pardoned if I refer here to the *Note on the Operation* which Army Major Veterinarian Ch. Guyon has published in the *Leclainche Revue* as I am sure it presents interesting points and offers valuable conclusions.

The Major was put in a sector where a large number of animals had been removed with the record of being *Roarers*, useless even on a walk. Most of them were draught horses, some of large and others of lighter sizes, rather strong, and again others in very poor condition. Familiar, and already well posted upon the operation, there was offered a good opportunity for a comparatively large experiment and the Major took advantage of it.

The technic of the operation presents little interest. The necessity for general anesthesia, considered useless or dangerous by some, is recommended. The animal being placed in complete dorsal position, and held by assistants, the first steps of the operation are carried out as described by different authors, the removal of the ventricular membrane is mentioned as follows: "After having tried in our previous operations the instruments recommended by Williams, Drouin and Cardiot, we now give exclusive preference to the extractor of Pecus with which, with a little practice the ventricular mucous membrane can be removed almost completely." The general after care is very simple and yet it would be an error to affirm that the operation is one "*absolutely without danger*". Hemorrhage with severe spells of coughing, accesses of suffocation, respiratory syncope, manifestations of asphyxia and some times necessity for temporary tracheotomy are accidents which must not be entirely ignored and which necessitate watching on the part of the operator. However, among the accidents likely to take place after the operation, *late respiratory syncope*, almost always fatal,

is one to be looked for, occurring ordinarily several weeks after the operation and taking place more particularly during meals, or also quite suddenly without apparent cause or any alarming manifestations a few minutes before; there is again another post-operative complication, viz: *Attacks of acute roaring*, which may be observed in operated animals toward the second month of a complete recovery. These spells occur suddenly and in a few days assume an extraordinary severity. *Chondroma* of the trachea may also occur as a complication following the temporary tracheotomy.

Besides the cases treated in private practice Major Guyon has operated on forty animals during his army services. He gives the following results: 6 radical cures; 22, marked improvement; 9 without improvement and 3 deaths.

CONCLUSIONS: 1st Williams' operation gives a successful average of about 60 to 65%. In the statistics given the word recoveries (*cures*), perhaps much abused at first, has been strictly reserved for those in which all signs of roaring had *entirely disappeared*. For the others the word improvement has seemed more convenient and true, as in the majority of cases the roaring did not disappear entirely but was more or less reduced; true recovery cases are indeed extremely rare.

2d *The classic theory of the frequency of the paralysis of the left arytenoid compared to that of the right is plainly confirmed by Williams' operation.*

3d *The severity of roaring is not always in proportion with the degree of paralysis of the arytenoids.* Some horses, roaring slightly or in a medium way do indeed present complete paralysis of the left arytenoid or paresis of the right, while loud roarers present only paralysis of the left cartilage.

4th *Williams' Operation, though contraindicated, is at least useless in animals which roar slightly; it has its true usefulness from the economic point of view, only with loud roarers.* The principal object of this elegant and rapid operation is to substitute it for permanent tracheotomy and its after care and dangers.

At any rate the American operation for chronic roarers deserves a special place in veterinary surgery and if it does not always give the marvellous results claimed by a few, it remains, nevertheless, an operation interesting from all points of view, likely to render useful horses which otherwise would have been condemned to the continued carrying of the old tracheotomy tube.



**EPIZOOTIC LYMPHANGITIS**—Our American confreres have full knowledge of this affection and if they have not had the occasion of seeing it in their practice at home, now that some of them may come over to France, their chances of meeting with the disease will be frequent.

These remarks were made to me lately by Dr. Crawford, a graduate from the Veterinary College of Philadelphia, whom I had the pleasure to meet. He was anxious to see some cases of epizootic lymphangitis and it was my good fortune to place him in the hands of a French confrère who, I hope, satisfied his desires.

European veterinary journals, at least the French and English, have had many articles written on the disease; its history, etiology, manifestations, etc., and it would require much writing and perhaps repetition to consider them here. Many authorities on the subject have spoken through our professional press and recently among them I find a long statement by Prof. Charmoy of Alfort, now doing duty in the army as Veterinary Major. Remarks are made on the *Cryptococcus Farciminosus* of Rivolta and its effects when once in the animal organism, where its entrance was made through the abrasion of the skin, no matter how small; on the changes that follow, the formation of cords, of buds, of lymphatic swellings, etc., all are considered.

The progress of the disease is very variable, slow in some cases, very rapid in others. Relapses are frequent.

The principal lesions are those of the skin and are well known and are fully described.

The clinical diagnosis is generally easy to make, thanks to the disposition of the abscesses, the character of the ulcerations, the aspect of the lymphatic cords. Doubtful cases can be eliminated by the examination of the discharge where the cryptococcus can be easily detected.

In the differential diagnosis, glanders must first be eliminated by the aspect of the ulcerations, and if necessary by the mallein test.

The prognosis varies according to the localization of the manifestations, when on the head, the neck or trunk they can be cured easily, when on the extremities the cure is more difficult, especially with the hind legs.

The treatment recommended by Major Charmoy, among the many, has for its basis the cauterization with the actual cautery

and he gives the description of the minute manner in which he proceeds in many of the cases, of which he presents also a detailed list.

"In all cases, the animal must be placed in the decubital position, as this is the only possible way to operate safely and conveniently. The lesions of the head and body as well as those of the external face of the legs present no difficulty. To operate on the internal face, with the animal down, the leg, taken from the hobble, is secured on the anterior or posterior corresponding, so as to expose it as much as possible. The lymphatic cords of the internal face of the thigh and of the inguinal region or their abscesses demand that the leg should be carried in great abduction as in the position for operation of inguinal hernia or for cryptorchidism.

The heated, ordinary pointed cautery is thrust into the cavity of each abscess, the opening of each ulceration, every prominent swelling of a lymphatic, where pus is always found more or less deeply situated. The borders and the bottom of the ulcers are freely cauterized and the point of the instrument carried in the two directions of the cavity of the vessel.

The second step of the operation consists in the application of points of fire, fine and penetrating, one centimeter apart, all around the diseased part, which according to the condition of the case may require two, three or even four rows of points of fire so as to limit the possibility of the extension of the diseased process. Sometimes when on the legs, the abscesses are too numerous or too close to each other, cauterization in points and in lines may be resorted to. Should a large vein be opened in this application, a simple knot as the one used in phlebotomy is sufficient to stop the hemorrhage.

A stiff friction of blister ointment is then applied over the whole of the cauterized surface. The next day and also the following the reaction is enormous. The region is very much swollen and becomes the seat of a more or less abundant discharge and towards the 6th or 7th day all subside gradually. A coat of vaseline and a few washings with soap will clean and remove all the scabs formed. A saturated alcoholic solution of picric acid or of methylene blue, dusting with powdered sulphur, boric acid or charcoal, complete the treatment.

**SERUM TREATMENT OF WOUNDS**—In my last chronicle, after a minute consideration of the value, indications, effects and results obtained by the use of the serum treatment of wounds with polyvalent serum, I concluded that the professional journals were offering to their readers the reports of many cases recorded by physicians as well as by veterinarians from which I intended to extract a few for the benefit of the readers of the *Journal*. When I came to investigate what I might gather, I found so many that I am sure our worthy editor would object to the space my reproduction would require. From all that I have to select I think the report published in the *Revue Generale* by Army Veterinarians A. Guillaume and G. Bittorer will, with their conclusions, be of sufficient interest.

In the treatment of the numerous wounds they have had occasion to examine, they have noticed that when the wounds were serious, the chemical antiseptic treatment did not always give the good results that might be expected. Notwithstanding most attentive and long care, recovery was obtained with difficulty; no matter what antiseptics were used or what surgical care given, lesions would often grow worse instead of improving and then it was decided to experiment with the serum, and their reports refer to the results they have obtained.

The serum (Leclainche and Vallée) was used by them only in serious and severe cases, which had proved rebellious to the ordinary methods of treatment. The cases on which they have written were selected from the most serious and difficult that came to them.

It would prove tedious to describe all the cases in detail or to mention the details resorted to. I will only indicate the nature of the case, it being understood that the application of the polyvalent serum finally brought recovery. Of course the time and treatment varied according to the nature, extent and condition of the diseased process.

There are four cases of wounds, injuries, abscesses and necrosed lesions of the withers. They were all deep, anfractuous, fistular and phlegmonous with necrosis of the tissues, aponeurosis, bony, etc. With all, the results were perfect. Then cases of wounds of the ribs with necrosis, of the back with deep suppuration, of a fistulous wound by a projectile, deep on the shoulder, one of the sternum, of the haunch, of some articulations, viz., the right elbow, of gangrenous dermatitis, of the extremities, of cuta-

neous quittor, of lymphatic structures, etc. The results of these complicated cases were all entirely satisfactory and as a conclusion to their article these army veterinarians say:

"The examination of these observations give marked evidence of the certain therapeutic effects of the serum, remarkable by constant and rapid improvement, after a first dressing.

(A) *Immediate effects.* In the first place there is the early *regression* of the inflammatory symptoms, which are sometimes alarming and the characteristics of which are modified.

1st—*Pain* is reduced, and there is a quick return of movement and improved general aspect.

2d—*Swelling*—Its disappearance and that of all lymphangitis.

3d—*Suppuration*—Less abundant; odorless and soon replaced by a rosy serosity. *Coagulating* on the borders of the wound.

(B) *General Condition*—Return of normal temperature.

(*Consecutive effects.*) *Repairing Action* accompanying and following resolution, and manifested first by the apposition of *regularly fine and dense granulating processes of repair followed by a normal final cicatrization.*"

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ANTIPYOGENIC POLYVALENT SERUM—Speaking this time of polyvalent serum I must no longer refer to what has been done in France by Leclainche and Vallée, whose usefulness is recognized by the entire press of that country, human as well as veterinary. I will consider the work done in Italy and the results that have already been recorded.

Two veterinarians, Prof. Lanfranchi and Finzi, whom I have already introduced to our readers by abstracts of some of their work, inspired by the work done by the French have also prepared a serum, for which, according to the *Revue* of Panisset, they use twenty varieties of microbes of various species: *Bacterium pyocyaneus*, *Staphylococcus aureus*, *S. citreus* and *S. albus*, *Streptococcus* of human and equine origin, *Coli*, *Paratyphoid A* and *B*, and some anaerobic species *Perfringens* and *Septic vibrio*. They keep adding constantly to the number of varieties which must serve for immunization, principally by the isolated microbes from war wounds.

The serum of Lanfranchi is slightly bactericidal for the pyocyaneus and staphylococcus and is possessed of curative and pre-



ventive properties for the streptococcus, the coli bacillus and the paratyphoid B.

Employed in the treatment of wounds which are not infected, it prevents all possible complications, insures a more rapid cicatrization of the tissues and in infected wounds it causes a physiological antiseptis, characterized by an immediate change in the supuration and brings on a more rapid cicatrization.

Principally recommended in wounds of the battle field, it may also be used for the prevention of tetanus and against the development of gaseous gangrene.

The Italian journals begin to give this serum the notice it seems to deserve. In *Il Nuovo Ercolani*, Dr. Mensa, who has used it extensively, speaks of its antibacterial power in general and of its antipyrogenic property in particular, which he considers preventive as well as curative. He has used it in local applications, in sub-cutaneous and in intramuscular injections. In many cases he has obtained recoveries by first intention. In foot operations with much division of tissues, the serum has prevented the supuration and also articular complications. In applying compresses of the serum on regions treated with deep punctured points of cautery he has promoted an aseptic inflammatory reaction most beneficial. For deep sutures he has used silk, which had been soaked or kept in the serum, and he has never seen any complications.

For Dr. Mensa, the serum assists the phagocytic action. It is able to modify the activity of the wound in which the granulating is slow and the work of repair deficient. It modifies the repair and regeneration of the tissues and promotes the elimination of necrotic elements. It also has an hemostatic action, well marked on fresh wounds. The efficiency of the serum is greater on mucous membranes than on the integument.

Sub-cutaneous injections of 10—20—50 c.c. have given excellent results in cases of rhino-pharyngitis, also in adenitis of strangles, in conjunctivitis, in closed fractures of the facial bones, sinusitis, in diseased withers, etc.

Other cases are also found in the Italian press where the benefits of the use of the serum are mentioned.

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A LARGE AEGAGROPILE—Hair balls are quite frequent among our domestic animals. If they are, very often, only post mortem

surprises and very seldom the occasion for a diagnosis during life and an urgent surgical interference, they are not entirely ignored in the annals of human surgery.

I have had occasion to read, in medical journals, records of aegagropile operated upon, but none probably so interesting as the one the *Presse Medicale* published in one of its last issues.

It was indeed a very curious observation, obtained from a four-year-old child, who was relieved by gastrotomy of a very large tumor filling the stomach entirely. The history was peculiar.

When the child was 3 years old she was first troubled with signs of indigestion. Her condition became so serious that radiography was resorted to, to help the diagnosis. The result was negative. A laparotomy of exploration was performed and the surgeon got the impression that the child had a strangulated intestinal loop, which he relieved. A noticeable improvement followed this operation but, after some time, the symptoms having returned more severely, another examination revealed the presence of a tumor, as big as a large pear and which was suspected to be of tuberculous origin. An heliotherapeutic treatment was instituted, which of course gave no results and it was then that by the reading of another case published recently, that careful inquiry brought out the facts that it had been noticed by the parents of the child that she was losing her hair during the night, that she was pulling it out. Hairs had been observed also in her fecal passages. She had also eaten pieces of sponge. The diagnosis was then easily made, that of a hair ball. The stomach was opened, the tumor removed and recovery followed.

The extracted tumor formed a mass about 36 centimeters long, 5 wide and 4 thick. It had the shape of the stomach and had a peduncle formed by a cylinder 15 centimeters long representing the mould of the duodeno-jejunum and this was continued by a small cord 2 centimeters in diameter. The tumor was formed of hairs, threads of wool and cords of various colors.

In dogs with long hair, similar conditions may have been met and our confrères who make dog practice their specialty may be able to mention cases of like nature.

## SUMMARY FROM RECENT PUBLICATIONS RECEIVED AND BIBLIOGRAPHIC ITEMS\*

REVUE GENERALE DE MEDECINE VETERINAIRE—May 15th. The use of a new metallic dressing. Vesicular stomatitis of horses. (O) Traumatic pleurisy in a horse.

RECUEIL DE MEDECINE VETERINAIRE. (April and May). The cancer of the thyroid gland. (X) On epizootic lymphangitis. (O) Laceration of the stomach and pyloric cancer in a mule. (O) Acute peritonitis by bursting of an abscess in a steer. (O) Curious anomaly of the lachrymal duct in a horse.

VETERINARY NEWS. Surgical condition encountered in canine practice. An interesting monorchid—Pasteur's versus British tuberculin. May 26 Eclampsia in dogs.

VETERINARY RECORD. (O) Melanotic sarcoma in a horse. (O) Entamebic dysentery in the dog. (O) Milk fever in a goat. (June 9th) (O) Tuberculosis in the horse.

VETERINARY JOURNAL. (June) Dietetic value of wheat bran. Intra-dermo-palpebral mallein test for glanders. (O) Fracture of the tibia. Case of spurious hermaphroditism. (O) Equine scabies in the mouse. Castrating ropes.

IL NUOVO ERCOLANI (May 15). Spirochetæ observed in a mole. A primitive sarcoma of the radius in a dog. (June) Ascending keraphyllocele in the horse.

CLINICA VETERINARIA. The lesions due to the bacillus of necrosis in domestic animals.

CORNELL VETERINARIAN. Sterility of cattle and methods of treatment. Diseases of new born calves. Equine infectious ophthalmia.

BIBLIOGRAPHIC NOTICES. University of Pennsylvania—School of veterinary medicine. Announcement of the session 1917-1918.

Collected Papers from the Research Laboratory of Parke, Davis & Co. Dr. E. M. Houghton, Director. In this 4th volume of the publication from the Director of the Laboratory are presented a series of reprints from the various journals where the original papers were published in 1915. This publication is worthy of the works collected and makes a valuable addition to the library of any scientific medical or veterinary practitioner.

REPORT OF THE CONGRESS HIPPIQUE FOR 1914. In this there are papers which were offered by veterinarians at the general meeting and to which later on, I will call the attention of our readers, viz: (X) On stallion carriers of infectious germs by Director Vallée and (X) On the surgical treatment of chronic roaring of horses by Dr. Fontaine.

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\*Titles marked "X" will be summarized. Those marked "O" will appear as abstracts.

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—Dr. D. E. Craig, formerly of Edmore, N. D., is now located at Mossbank, Sask., Canada.

## STUDIES IN FORAGE POISONING V\*

A PRELIMINARY REPORT ON AN ANAEROBIC BACILLUS OF  
ETIOLOGIC SIGNIFICANCE

ROBERT GRAHAM, A L. BRUECKNER, AND R. L. PONTIUS

Bulletin No. 207 of the Kentucky Agricultural Experiment Station is devoted to experimental studies dealing with the cause of forage poisoning. It is a technical bulletin as the cause of a disease is necessarily a technical subject, yet it has an exceedingly practical bearing upon the live stock industry in the ultimate control of this disease. Forage poisoning is also known as cerebrospinal meningitis, cerebritis, staggers, et cetera, and is prevalent throughout the Middle West. The cause of this disease in live stock has remained an open question, yet moldy feed has been considered by some the exciting factor. Laboratory workers, both federal and state, inform us that the experimental feeding of various suspected molds found upon poisonous feed has not been consistently productive of the disease. No denial is made of the common presence of molds in some feeds that apparently contain the cause of forage poisoning, yet the disease-producing power of molds existing upon feeds, independent of other factors, has been seriously questioned by many investigators. That certain molds may favor the development of the primary cause of this disease is brought out by experimental tests at the Kentucky Station, and the reader is left to infer that bacterial toxins or poisons capable of causing clinical forage poisoning may readily develop in association with molds under laboratory conditions.

The Laboratory of Animal Pathology of the Kentucky Station from which this work emanates has by reason of the numerous natural outbreaks of forage poisoning in the Blue Grass Region had excellent opportunity of observing the disease. An oat hay obtained from the Griffith Brothers stock farm near Lexington, Ky., was found by feeding tests to incorporate the causative factor. The disease was consistently produced in horses by feeding the hay and also by allowing horses to consume water in which the oat hay had been immersed. A liberal amount of the oat hay in question provided material for experimental studies for a period of two years, during which time various observations upon the dis-

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case were made. Various microorganisms were isolated from the oat hay which proved to be non-pathogenic. The investigators were able, however, to isolate a toxin-producing germ from the oats which resembled one of the germs (*Bacillus botulinus*) long known to cause meat poisoning in man. In 1901 the late Dr. Leonard Pearson of the University of Pennsylvania suggested that forage poisoning in animals possessed a certain clinical analogy to meat poisoning in man. This theory has received consideration by Drs. Mohler, Buckley and Shippen of the Bureau of Animal Industry, who report the fatal effect produced by *B. botulinus* when fed to horses and mules. However, it has remained for Graham and his co-workers at the Kentucky Station to furnish specific evidence of such a correlation by isolating an organism resembling *B. botulinus* from a poisonous oat hay. This organism upon being artificially grown in the laboratory and fed to horses produced clinical forage poisoning and death.

In studying the relation between the germ isolated from the oat hay and *B. botulinus*, the writers resorted to the practical application of serum made from *B. botulinus*. It was found that botulism antitoxin protected horses and guinea pigs against a fatal artificial infection of the organism isolated from the oat hay and also proved efficacious in protecting horses drinking water in which the oat hay had been immersed.

These investigations were also continued in the examination of silage which produced death when fed to horses. From this silage a similar disease-producing germ was isolated. Similar results were obtained in protecting guinea pigs and horses against a fatal artificial infection of the organism isolated from the silage by the use of botulism antitoxic serum.

The theory that poison-producing organisms of the type causing meat poisoning in man must of necessity develop upon meat products is apparently not well founded, as laboratory evidence indicates that corn silage decoction, as well as other forage extracts, furnishes favorable food for their growth in the laboratory. The presence of this type of organism in nature upon feeds which were found to produce forage poisoning is indisputable evidence. The possibility still remains that there may be several causes of forage poisoning, yet the establishment of one etiologic factor, together with a reliable serum treatment, should prove valuable in the ultimate control of this disease.

## TUBERCULOSIS IN CARNIVOROUS ANIMALS\*

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The identity of tuberculosis in human beings, and in certain domestic animals closely associated with man, and the possibility of one infecting the other, renders this disease of the greatest importance to us as veterinarians, and to all students of comparative medicine and pathology.

During the past few years a considerable amount of literature has appeared on tuberculosis of the dog and cat. It is principally due to the work of Eber, Jensen, Cadiot, Douville, Hebrant and Antoine that the study of this disease in the dog and cat has been placed on a firm basis. Professor Eber, the famous tuberculosis expert, and the Director of the Veterinary Institute Laboratories at Leipsic has been working for a number of years on the relationship of the various types of tubercle bacilli. His researches furnish abundant evidence that the two types of tubercle bacilli, the human and the bovine, are not types of subspecies with constant characters, but rather varieties of one and the same bacillus, with relatively variable characters. He recognizes that the bacilli cultivated directly from the human or bovine sources possess certain biological characteristics which permit of a distinction, in the majority of cases, between the human and bovine types.

In his experimental work in carrying the human type tubercle bacillus through guinea pigs, calves and cattle, Professor Eber succeeded repeatedly in changing the morphological characters of the human bacillus to that of the bovine type. This work Professor Eber has splendidly demonstrated by means of gross pathological specimens showing the characteristic lesions through the successive stages.

In a number of my cases the tubercle bacilli were demonstrated by cultural and inoculation experiments to be of the human type. Except in two instances all the dogs and cats which I have examined, and recorded in this paper were house pets, and in the cases of at least three dogs and one cat the owners of the animals, I have good reason to believe were suffering from some form of tuberculosis, generally pulmonary.

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**METHODS OF INFECTION.** In a large percentage of the cases examined the lungs with their lymph glands, especially the lymph nodes situated at the bifurcation of the trachea showed extensive tubercular deposits, while other lymphatic nodes were edematous or in the process of caseation. In many cases, primary infection doubtlessly takes place by way of the respiratory tract. It seems to me probable that tubercle bacilli enter the lungs and pass to the communicating glands without giving rise to preliminary lesions in the organs with which they first come in contact.

In other cases primary invasions take place by way of the intestinal canal through bacilli taken in with food or contaminated drinking water. Primary invasion by way of the intestinal canal is not, in my judgment, the common source of invasion, but that the intestines and abdominal organs are infected secondarily through the breaking down of tubercular deposits in the lungs finding their way into the bronchial tubes, finally reaching the throat, the animals swallowing the secretions containing the bacilli in great numbers, some of which would doubtless escape the action of the gastric juices, pass on to the intestines, and if in sufficient numbers produce tubercular enteritis, or they might pass to the mesenteric lymph glands without producing any lesions whatever in the intestines.

Experimental evidence apparently shows that a relatively large number of tubercle bacilli are necessary to experimentally infect healthy animals by ingestion. Probably if the mucous membrane be not intact, a smaller number of the bacilli would suffice.

The rarity or total absence of tubercular lesions in the stomach would indicate that the gastric juice possesses power to prevent the growth of the bacilli.

My study of tuberculosis among domestic and wild carnivorous animals has been of particular interest, and certain facts have been apparently established in connection with this disease. The general character of the lesions produced by tuberculosis affecting these animals corresponds very closely to those of the human, and the bacilli found also simulate morphologically those of the human infection. Chronic tubercular lesions are much less frequent in the wild carnivorous animals in confinement. Healed tubercular lesions have been frequently observed in the lungs of dogs; but I have never noted any evidences of the pronounced fibroid changes of pulmonary tuberculosis in any of the wild species of carnivorous animals. I infer from these facts that the disease is of a much

more virulent type in the carnivores, and that the rule is death in infected animals, while in man the average case recovers.

In man, one frequently finds healed tubercular lesions in the tissues, particularly the lungs. In man, dying of other than tubercular disease healed tubercles are found to be present in from fifty per cent to eighty percent of cases.

This observation may be compared with the characteristics of human tuberculosis when it affects a primitive people particularly one in whom tubercular infections are infrequent in their natural habitat. We may thus compare the tuberculosis of wild carnivores to that of the Indians, of the Esquimaux, or even to that of the negro in his native land. We know that tuberculosis in these peoples practically always assures a virulent form, and that the rule is death.

It is practically certain that no wild carnivore has ever died of tuberculosis in its wild habitat, so that when it is brought into captivity, it possesses no natural immunity to tuberculosis, such as the domestic species has acquired, as a result of long and intimate association with civilization.

From my observations in regard to tuberculosis in wild animals, I am thoroughly convinced that the offspring of wild animals in captivity are less liable to succumb to the infection than those animals coming direct from the jungle, that is, of course, assuming the conditions of infection and environment to be the same. It will be of interest in this connection to cite a case of pulmonary tuberculosis occurring in a recently captured Arctic seal. This seal was captured by a party of American sportsmen who were on a hunting expedition in the Arctic regions, and on their return deposited the seal in the Zoological Park. From the date of capture to the time the animal was deposited in the Park was exactly six weeks, during which time it was on board ship.

On its arrival at the Park it was noticed to be in ill health, had refused all food, and finally died within a few days. The autopsy revealed very extensive miliary tuberculosis throughout the lungs. It is somewhat interesting to consider the infection of this animal, recently from the Arctic regions where tuberculosis is unknown, with the similar fate of the Exquimaux who were brought to this country by Lieutenant Peary, all of whom contracted tuberculosis within a few days after landing. The great rapidity of these cases is most instructive in that it teaches us to especially guard against

the possibility of infections for animals coming from a widely altered habitat.

**SYMPTOMS—DOGS.** The disease as seen in the dog generally runs a chronic course, but it may at any time assume an acute form.

In practically all cases of tuberculosis in the dog the clinical evidences of the disease in the early stages are manifested by symptoms, which, in themselves are not characteristic.

In some instances there is an occasional short cough, which may increase and continue for several weeks or even months without other marked symptoms becoming manifest. After an interval of several weeks, in the majority of cases, more definite symptoms of tuberculosis make their appearance. The owner will tell you that the dog has a capricious appetite, and that after slight exertion appears weak and exhausted, and that it is slowly losing weight. Later the soft parts of the scapula and dorsal region become shrunken, allowing the bony parts to stand out prominently. The flanks seem to be slightly fallen in, and the abdomen appears pendulous. The mucous membranes are pale, and the facial expression is dull and stupid. The coat is dull and erect giving the animal an unthrifty appearance. There is generally a steady loss of condition even though the appetite remains good.

Pulmonary tuberculosis begins with a short dry cough which frequently leads the animal to vomit. Later the cough becomes more frequent and the respiration more and more labored. Dry and moist rales may now be heard on auscultation. When the pleura is involved, in addition to the friction sound, there is pronounced bronchial breathing with fixed or rigid thoracic walls often accompanied by moaning and groaning at each respiratory movement. Sensitiveness of the thoracic wall is manifested on percussion.

If there is much fluid in the pleural cavity, the flanks heave or have a pumping-like action, accompanied by ballooning of the cheeks. The fluid from the thoracic or abdominal cavities is blood stained serum, and quickly consolidates on exposure to the air. This condition I consider an important diagnostic feature of tuberculosis in the dog.

In two of my cases symptoms of accumulations of considerable quantities of serous exudation in the thoracic cavity were apparent in the early stages of pulmonary tuberculosis. In the advanced stages of this disease in the dog, the greatly emaciated and



exhausted animals are seized with spasmodic coughing. When the bronchial or mediastinal glands are affected, they are generally greatly enlarged, and the paroxysms of coughing are frequent or nearly constant.

The slightest exertion causes the dog great distress. Fainting spells are common at this stage of the disease, and are brought on by slight excitement. Excessive thirst and polyuria are also prominent symptoms. In some cases tubercular dogs may live for many months without showing great disturbance, while in other cases death is quickly brought about by exposure resulting in pneumonia. In these instances the dog rarely flexes its head, and the neck is always extended. There is always a great variation in the temperature, although rarely over  $103.5^{\circ}\text{F}$ . You may frequently find the temperature subnormal. The heart pulsations are generally weak and rapid. When the pleura is involved, changes in the pericardium itself are present.

Tuberculosis of the abdominal organs is indicated in a general way by ascites and impaired nutrition, as a result of which the affected animals become emaciated and anemic.

Aspirating the fluid from the abdominal cavity gives only temporary relief, making it necessary to repeat the operation at intervals of a week to ten days. The fluid obtained is nearly always blood stained and quickly solidifies on exposure to the air. If the liver, lymph glands, and spleen are involved, the enlarged tubercular nodules can generally be felt through the abdominal walls by careful palpation. The bowel movements are irregular, diarrhea with much mucus is frequently present.

Believing that you will derive more benefit from the reporting of a few concrete cases of tuberculosis in the dog, which have come under my personal observation during the past ten years, I would offer the following case reports from my records:—

CASE NO. 1: Cocker Spaniel, male, four years old. Had been for the past three years, the constant companion of his owner, who was suffering from pulmonary tuberculosis, and was at the time of the animal's death, an inmate of the Seton Home for Consumptives in New York City.

When the dog was examined it was suffering from pneumonia, pleurisy, and ascites. Was in fair condition of flesh, but appeared much older than four years. The dog died two days later, and on autopsy showed extensive generalized tuberculosis. The lungs

were greatly congested and showed chronic caseated tubercles; the heart and pericardium, extensive tubercular deposits, with adhesions to the lungs and myocardium. There were about three quarts of bloody serous fluid in the thorax. The pleura showed numerous small miliary tubercles. The anterior mediastinal lymph gland was greatly enlarged and showed numerous areas of softening.

The liver was greatly enlarged and covered with small miliary tubercles. There was a great amount of fluid in the abdominal cavity. The spleen was normal. The mesenteric lymph glands were enlarged and edematous. The right kidney showed several tubercular foci about  $\frac{1}{2}$  inch in diameter. The diseased organs were placed at the disposal of Dr. Park, of the New York Health Department, who demonstrated the tubercle bacilli in the lesions from the different organs to be of the human type.

CASE NO. 2: English Bull, male, two years and eleven months old, owned by Mr. S., New York City. In good health the dog weighed fifty pounds, and was very active. Early in April he got into a fight and after the owner separated the contestants, his dog collapsed (fainted). Soon after this date the dog began to lose weight, and as the thinness became noticeable, the owner suspected the dog had worms and treated him for them, but none were found.

On January 24th I saw the dog for the first time. There was a well marked broncho-pneumonia present with considerable pleurisy. With treatment the animal made a seemingly good recovery, but convalescence was slow. Several weeks later, I was called again, the owner giving me a history of fainting spells on slight excitement. The appetite was normal in every respect. On microscopic examination of feces no ova of parasites were found. Blood smears showed extreme anemia. No ova of *Filaria immitis* were found, although I suspected these blood worms on account of the frequent fainting spells. The lungs were congested, pulse irregular and rapid. Dog again showed improvement after administration of strychnine, iron and arsenic. For several weeks the dog showed some improvement in spirits, but none in flesh. Liver was larger than normal, as well as spleen. Spleen being enlarged, I suspected leukemia, but the blood examination did not assist in this opinion. This dog was exhibited at the State Veterinary Society meeting in Brooklyn. No diagnosis was made. Early in November, I again saw the dog, and he had emaciated greatly. Now had no difficulty in feeling nodules on the surface of the spleen and liver,

Called Dr. Mangan in consultation telling him that I suspected tuberculosis.

On November 7th this animal was photographed and destroyed.

*Post Mortem Examination.* The lungs were congested and presented fibrous miliary tubercles scattered uniformly throughout. The bronchial and mediastinal lymph glands enlarged throughout. The liver weighed five pounds and large tubercular masses present 1" x 2", 3" x 4½" in size. The kidneys showed several miliary tubercles. The spleen slightly enlarged, and with few tubercles.

The large and small intestines showed tubercular ulceration.

The microscopic examination of the sections from the lungs, liver and other organs showed typical tubercular lesions.

CASE No. 3: Bull Terrier, male, 3 years old, had been treated for bronchitis for several weeks, apparently without improvement, appetite good. When presented to me, animal showed emaciation, labored breathing, temperature 103°F. Anemia. On palpation I was able to detect nodules on the liver without difficulty. Advised destruction of animal, owner consenting. Autopsy showed generalized tuberculosis with lesions showing in lungs, pericardium, bronchial lymph nodes, liver, spleen, kidneys.

CASE No. 6: A very large brindle bull dog, male, owned by Mrs. F., of New York City. This animal was nine years old, very fat. Was consulted in May on account of the animal having chronic cough, occasional diarrhea, and easily fatigued on slight exertion. Temperature 103°, rapid respiration, heart irregularly intermittent. Mucous membranes pale. Examined stools for parasites, negative. Gave codeine for the cough, and regulated diet, eliminating all starch substances which formerly made up the principal diet. From May until September did not see this dog again, but when I was called in, early in September, found a very greatly emaciated animal with a history of chronic cough, and fainting spells brought on by the animal going up two flights of stairs. Anemia and jaundice marked, pronounced pleurisy and bronchitis. Found nodules on the surface of the liver, diagnosed tuberculosis, and advised chloroform. The owner did not consent to this but wished the animal to die a natural death. About two weeks later the owner telephoned, wishing the animal chloroformed, but before I could reach the house the dog had died.

CASE No. 7: French Bull Terrier, male, aged 12 years, owned by Mr. S., of New York City, a very healthy; well nourished, ac-

tive animal, suddenly developed asthmatic symptoms and ascites. Two quarts of blood-stained serum were taken from the abdomen which seemed to give relief for about four weeks when the dog was again returned on account of excessive fluid in the abdomen. The owner was advised that it was useless to treat the animal, but on account of sentiment, refused to have it destroyed, and insisted upon treatment as long as the animal would live without apparent distress.

At intervals of about ten days, large amounts of fluid were taken from the animal's abdomen. From the second tapping the dog showed progressive emaciation, and finally after several months, I was able by palpation to detect the nodules on the surface of the liver. The dog finally died from asphyxiation due to acute edema of the lungs. The autopsy showed generalized lymphatic tuberculosis.

CASE NO. 9: French Poodle, 6 years old, female, had been in poor condition for several months. Suffered from occasional diarrhea, but as microscopic examination of the feces showed that the animal was infested with whip-worms the diarrheal condition was attributed to these parasites. The animal, after a full meal on a very hot day, had been let out in an exercising field, had a convulsion, and died without gaining consciousness, considerable blood coming from the nostrils.

The autopsy showed death to be due to acute dilatation of the heart as a result of acute indigestion. The following condition of tuberculosis was found:

The pleura showed very extensive thickening with a great many pearly like tubercles scattered throughout the surface. The pericardium was also thickened and tubercles numerous. The lungs were congested and edematous and contained many tubercles with numerous irregular shaped cavities, varying in size from  $\frac{1}{8}$  to  $\frac{1}{2}$  inch in diameter. The cavities were generally collapsed and were lined with necrotic tissue which had a dirty greyish oily appearance. The bronchial and mediastinal lymph glands were enlarged and showed areas of softening. The liver was congested but not tubercular. The spleen showed four tubercles about the size of a pea on the surface of the organ. These were not close together.

The kidneys were congested but no tubercles were found. The mesenteric lymph nodes were enlarged, reddish in appearance and edematous on section. None showed any necrosis. The intestines

showed numerous whip-worms but no evidence of tubercular ulceration.

CASE NO. 14: Old English Sheep Dog, female, age 7 years, owned by Mr. M., of New Jersey. This animal began to fail in condition during the winter of 1915, and to show later evidences of extreme anemia and eczema. This animal had had irregular periods of estrum, and while served by a number of different sires, failed to prove in whelp. In February 1916, I was called, found the animal suffering from a catarrhal tubercular metritis, and very ill. I suggested spaying, but as the owner could not show or breed the animal after such an operation, and since he was not otherwise particularly attached to the animal, he did not look with favor on such an operation.

No permanent relief was afforded from treatment, and the dog gradually emaciated until November when I found in addition to the involved uterine horns, an enlarged spleen and liver, the latter being distinctly nodular and sensitive to pressure. I told the owner that the animal would die very shortly, and then he requested an operation. I suggested an X-Ray first, and this was readily agreed to, and arrangements were made for this two days later, and on the following day, the operation was performed, the owner and kennel manager being present.

The radiographs and subsequent operation proved the correctness of my diagnosis.

The operation revealed an extensive tuberculosis of the liver, spleen and lymphatic glands.

LESIONS OF TUBERCULOSIS IN THE DOG. The lesions of tuberculosis of the dog are found affecting almost all of the organs of the thoracic and abdominal cavities, but the organs most frequently affected appear to be the lungs, pleura, lymphatic glands of the thoracic regions, and the liver.

The lung tubercles are generally of a greyish color and of a fibrous consistency. They may undergo softening, and then the centres of the tubercles contain pus. In some cases typical miliary tubercles, resembling the same type of the disease in the human, are seen, the lesions being scattered throughout the substance of both lungs. The pleural cavity frequently contains a large quantity of amber colored serous fluid. The lesions on the pleura consist of thickening with large irregular masses, having on their surface firm granulations resembling miliary tubercles found else-



where. The pericardium shows similar lesions, and the pericardial sac may contain a considerable quantity of blood-stained serous fluid.

The lymphatic glands, especially the bronchial and mediastinal, are generally enlarged whenever the organs in the thoracic cavity are involved. Sometimes these glands are enlarged to such an extent as to give rise to the opinion that they are new growths, and they have doubtless been mistaken for sarcoma. The lymphatic glands are sometimes firm or fibrous in consistence, but they more frequently undergo softening in the centre, and on section show a sticky yellowish or milky fluid, or a cheesy mass.

The abdominal cavity may contain several quarts of yellowish blood-stained fluid. The peritoneum shows typical miliary tubercles resembling the pearly lesions so often found in tuberculosis of cattle.

The liver, next to the lungs is most frequently the seat of tuberculosis. The tubercles here are greyish or whitish in appearance, some of them fibrous and firm, and varying in size from that of a pea to an orange; some of these tubercles bulging out on the surface to such an extent that no difficulty is experienced in detecting them on palpation.

The kidneys show various sized tubercular masses generally confined to the cortex. Some have been found to occupy one-third of the kidney structure.

**TUBERCULOSIS IN DOMESTIC CATS.** The opportunities for studying tuberculosis in the domestic cat in my experience have not been good, and when a veterinarian is called, he usually finds the cat in a greatly debilitated condition, showing extreme emaciation and anemia. The respirations are labored, the pulse weak and the temperature subnormal. The loss of flesh and the flaccid condition of the abdominal muscles will permit of abdominal palpation; and this frequently enables one to detect alterations in the kidney, liver, and abdominal lymph glands. The owner will generally give you a history of the animal's ill health for a period extending over several months.

The chief difference in the cat's habits noted are dullness or drowsiness and its disinclination to play or move about, the varying appetite, and a wheezy cough. Another symptom which I have noted is sunken eyes and the yellowish discoloration and bloodless appearance of the conjunctiva.

The lesions of tuberculosis in the domestic cat, in my experience, have been located principally in the abdominal organs, the lymphatic nodes, kidneys, peritoneum, spleen, liver and lungs, point of frequency in the order named. When the lungs have exhibited lesions, they were generally few and scattered and of the miliary form, while the abdominal organs showed more extensive lesions of diffuse character. I have seen the structure of one kidney entirely replaced by a tubercular mass.

REPORTS OF CASES.—CASE NO. 2. Maltese cat, male, nine years old, owned by Mrs. S. Fordham, New York City. Up to within a few weeks this cat had been very active. It recently had suffered from frequent attacks of diarrhœa, and had been treated for worms on several occasions, but no worms had ever been found on the examination of the stools. The appetite was always good. Thirst was excessive, and polyuria had been present for a number of weeks. The condition of flesh at the time of first examination was good, except for the muscles of the head and face, which showed emaciation.

The skin lacked tone, and the hair was dull and dusty in appearance. On auscultation of the lungs nothing abnormal was detected.

The temperature, pulse, and respirations were normal. The mucous membranes of the eyes were pallid and yellowish stained, and the eyeballs sunken, and they had a very dull expression. The abdominal walls were flaccid, and palpation showed the right kidney enlarged, rough and nodular. The lymphatic nodes appeared enlarged.

After an interval of several weeks, during which time the animal had received symptomatic treatment, the evidences of severe illness were so marked that the animal was destroyed.

*Post Mortem Examination.* The carcass was greatly emaciated. The lungs showed numerous miliary tubercles. The pleura in several areas showed fibrinous exudates. The heart apparently normal. The thoracic lymphatics enlarged and edematous, but no areas of softening. The liver showed few miliary tubercles; also the spleen. The kidneys showed large tubercular masses; the right kidney two large masses  $\frac{5}{8}$ " x 1" on the cortex, also other cheesy tubercles throughout the structure. The mesenteric lymph glands were much enlarged and edematous, but no caseous degeneration on gross examination. The stomach and intestines were extremely anemic but no gross evidences of tuberculosis.

CASE NO. 3: Maltese Cat, male, age about nine years, owned by Mrs. S. Tremont, New York City, who sought professional advice on account of abscesses developing in the muscles of the neck, just anterior to the scapular—humeral articulation. The cat had been anemic for months, but during the past few weeks had been emaciating rather rapidly. Appetite at times very good, but the thirst had been abnormal for a long time. The cat, on examination, showed the facial expression, which I have learned to recognize as "tubercular expression". This is the peculiar emaciated character of the muscles of the head and face, the sunken eyeballs, pale mucous membranes, and the dull stupid expression of the eyes. In addition to the abscess, which had opened and was discharging a thick cheesy material, the superficial lymphatics were found greatly enlarged. The right kidney was enlarged, nodular and painful on palpation. Advised chloroform, owner consenting after diagnosis of tuberculosis.

*Postmortem Examination:* The carcass showed extreme emaciation. Lymphatics enlarged, some showing caseous degeneration. The lungs showed a few scattered tubercles of small size, bronchial lymphatics enlarged and with cheesy degeneration and pus.

The pericardial sac contained increased amount of serum, heart muscle anemic, soft and flabby. The mesenteric lymphatics were greatly enlarged and showed evidences of softening. The spleen showed several reddish-white tubercles. The liver showed numerous small tubercles. Both kidneys showed extensive tubercular areas, the right one practically replaced by a tubercular mass.

The stomach was anemic and catarrhal. The small and large intestines were apparently normal.

CASE NO. 5: Black and White Cat, male, several years old, owned by Miss R. a school teacher of New York City, who found this very friendly and intelligent animal on her door step one evening. He took kindly to his new home, and his cleanly habits indicated that he had been somebody's close companion.

The animal, while not emaciated, was rather thin, but the abundance of good food and care, did not improve the physical condition to any extent. After several months, the animal began to emaciate and lose its spirit. A veterinarian was consulted and prescribed tonics, which for a time seemed to improve the animal's condition. Some weeks later, I saw the animal, and the following condition was noted: The cat showed great emaciation of the

muscles of the head, face and pectoral region. The eyes were sunken, the membranes extremely pale, yellowish stained.

The cat had had a distinct cough, for the past two weeks, this cough being more pronounced when he would first go out-of-doors.

The thyroid gland was enlarged. The abdominal muscles flaccid, and on palpation the liver and spleen were found enlarged, and distinctly irregular or roughened. Diagnosed tuberculosis, and advised chloroform. After three days, the owner consented to the animal's destruction, but in the interval had consulted another veterinarian who had apparently confirmed my diagnosis.

*Post Mortem Examination:* Carcass greatly emaciated with total loss of subcutaneous fat, the tissue yellowish stained in appearance. The bronchial lymphatics very large and areas of focal necroses present. The lungs showed many tubercles of various sizes, some of them active. The liver was congested and enlarged. No tubercles were seen. The spleen was enlarged, congested and showed seven tubercles about the size of a pea. The kidneys showed numerous tubercles, all of them cheesy in consistency. The abdominal lymphatics were apparently normal, as were the stomach and intestines.

**TUBERCULOSIS IN WILD CARNIVORES.** Tuberculosis is not a rare disease among the larger carnivora, such as the lion, tiger, leopard, puma, or the smaller South American wild cats, when subjected to close confinement in menageries or traveling circuses. In these animals the disease generally assumes the lymphatic form, although I have seen cases of pure pulmonary tuberculosis in which cavities in the lungs were found, which resembled the typical cavitations so frequently observed in the human lungs.

The great difficulty in determining when an animal first becomes tuberculous makes it practically impossible to prevent the possibility of infection to its companions. Particularly, is this danger greatest when animals are kept for exhibition purposes, and when it is necessary to confine several in a single cage. While it is quite safe to say that hardly any wild animal possesses an absolute immunity from tuberculosis, yet certain species and individuals are undoubtedly less susceptible than others.

The following case reports will indicate the character of tuberculosis as it appears in wild carnivorous animals:

**CASE No. 1:** A hybrid Lion-Tiger, male, 7 years old, a cross between a male tiger and a lioness, owned by the Hagenbeck

Show. This animal was a trained performer and was exhibited with eighteen other lions, tigers and leopards throughout the larger cities of the United States during 1903. When the show reached New York, I was consulted about the animal's condition and learned that he had been failing in condition for several weeks. The keeper believed he had caught cold several weeks before and that he had pneumonia. He was so ill and weak for about two weeks that he was unable to go on with his performance. About ten days before I saw the animal, the keeper stated that it had a hemorrhage, which, he thought, came from the stomach, but had shown some improvement during the past week.

Owing to the great value of the animal, and fearing the danger of losing it if allowed to continue to travel in its present condition, the owner, Mr. Hagenbeck, requested of the Zoological Society, permission to move it to the Zoological Park, where it might be properly cared for, and at the same time be placed on exhibition.

The request was granted and the animal exhibited in an isolated cage of the Lion House, where I had it under observation for several weeks. Under these surroundings the animal showed some improvement for a time. Gradually, however, emaciation took place, accompanied by extreme anemia and occasional diarrhea. There were frequent attacks of coughing, followed by discharges of mucus, containing blood, and occasionally slight hemorrhage from the lungs or nostrils. While I could not auscultate the lungs, there was every evidence of extensive lung affection, doubtless tubercular in character. At this time, the animal being no longer fit for exhibition, he was removed to the hospital room, where there is an abundance of sunlight and fresh air. He continued to fail and finally died.

The post mortem examination showed extensive pulmonary and lymphatic tuberculosis. The lungs, in addition to the typical miliary and larger necrotic tubercles, showed numerous large and small tubercular cavities, several of these as large as two or three inches in diameter. The spleen and liver also showed a few miliary tubercles.

CASES NOS. 3 AND 4: During the year 1913, the Zoological Society received as gifts two unusually large and fine adult African Leopards. As usual with all newly acquired carnivores, they were placed in quarantine in the hospital room of the Lion House for observation, and to guard against the possible introduction of distemper into our collections.



After three weeks, one of the animals did not seem to be in good health, and the period of quarantine was extended. This particular animal continued to fail and finally died after exhibiting pulmonary involvement.

The post mortem examination showed that while the animal was well nourished, the lungs, liver and abdominal lymphatics presented extensive and advanced generalized tuberculosis. The second animal, after an interval of two months became ill, showing lung complications and hemorrhages on several occasions and finally died. The post mortem examination showed generalized tuberculosis with lesions similar to those of the first leopard. In these two cases, neither animal was ever placed on exhibition. These two cases showed the value of our quarantine system, and thus, well supported my contention that the average case of tuberculosis is contracted before the animal reaches the park, either under the unfavorable conditions found in quarters of animal dealers, or under the still more unhygienic surroundings prevailing in transit. It may be of interest to know that since 1902 tubercular diseases have played a very unimportant part in our death-rate. This is due: 1—The careful selection of animals purchased. 2—The hygienic buildings in which they are quartered. 3—The rigorous exclusion of all animals known or suspected to be tubercular, from the cages of the uninfected. 4—At the first signs of the disease in any of the animals, separating them from the healthy, washing the cages and thoroughly disinfecting after the removal of such animals, and before healthy ones are placed in these departments.

When we consider the high percentage of tubercular diseases prevalent among domestic ruminants throughout the country, we have good reason to feel proud of our record of so few cases of tuberculosis among our animals generally.

CASE NO. 5: This animal, a very valuable adult male, Siberian Tiger, during the fall of 1915 first showed signs of illness and was promptly isolated. Notwithstanding a splendid appetite, he continued to lose flesh. The first suspicion I had of tubercular infection was a harsh moist cough, and a profuse hemorrhage from the lungs. The hemorrhages occurred at intervals of a few days. The animal finally died.

The post mortem examination showed acute pulmonary tuberculosis with cheesy deposits in the lungs, bronchial and mediastinal lymphatic glands. The mesenteric glands also showed involve-

ment and the small intestine exhibited ulcerated patches. This animal's cage mate while looked upon as suspicious and consequently isolated, has not, up to this date, shown any evidences of infection.

CASE No. 6: A binturrong or "bear cat" (*Arctictis binturrong*) which had been in the collection but a few weeks died after a week's illness, and on autopsy showed extensive pulmonary and lymphatic tuberculosis.

*Treatment:* The treatment of tuberculosis in the domestic dog and cat is useless, and when a diagnosis has positively been made, humane destruction is the only thing to be advised. A tuberculous dog or cat, on account of the generally close association with its owner is a very dangerous animal to have about the home, especially if there are young children in the family. Occasionally you will find clients, who will refuse to have their animal destroyed, and are willing to assume all risk and danger from infection and insist upon medical treatment, hoping that you are mistaken in your diagnosis. Since tuberculosis in the dog and cat generally assumes a chronic course, the symptomatic treatment with tonics such as strychnine, arsenic and nuclein, with a liberal and nutritious diet, these cases nearly always produce a decided improvement in the animal's condition. The client then feels sure you were mistaken in your diagnosis. This improved condition stimulates false hope for the animal's ultimate recovery.

After an interval of a few weeks or months, however, acute symptoms appear, and the owner is now willing to have the animal put to sleep.

In wild carnivores the symptoms are more acute, and prompt isolation or destruction is the only thing to be recommended, followed by thorough disinfection of cage and quarters.

CONCLUSIONS. Although the diagnosis of tuberculosis is often suggested by a suspicion of an infection, this of itself is not sufficient to justify the positive diagnosis of tuberculosis in carnivorous animals. Great importance should be attributed to any enlargement of the lymphatic glands. While this enlargement may occur as an independent affection, it is usually found to be an indication of tuberculosis of some other abdominal organs.

The history of cases of tuberculosis in dogs is most important. You will generally learn that the animal has had pneumonia or chronic bronchitis. The respirations have been rapid and labored

for a considerable time, and the breathing does not improve to any great extent, while the animal is at rest. The owners cannot understand why the animals do not improve in condition in view of the fact that special attention has been paid to the diet, and considering the amount of nutritious food consumed.

In the later stages of the disease, when emaciation is present, palpation of the abdominal organs is a simple matter, and will generally lead to the detection of the tubercular lesions on the liver, spleen or other organs.

Tuberculin has been used to some extent for diagnosis of this disease in dogs, but my experience with this agent has not been satisfactory, but rather confusing. This may be due to the tuberculin. Douville's conclusion upon the result of tuberculin as a diagnostic agent may be summarized as follows: after the subcutaneous injection 8/10 to 1½ c.c. of tuberculin, the dose depending on the size of the dog, you may get a reaction from the 5th to the 8th hour. If, after the injection the temperature should rise to 104°F. or above, the reaction should be considered positive.

The injection of tuberculin in dogs fails in about forty per cent of cases. Sometimes it is dangerous since it may intoxicate, or be followed by death.

In cats, tuberculin is uncertain, or may be dangerous for animals free from the disease.

Except in two instances, I have never met with tuberculosis in large kennels of dogs, where autopsies are a matter of routine. In both these instances the dogs were show animals, and frequently exhibited in Dog Shows in numerous cities in the East, and were thus more frequently exposed to infection.

The disease is more often seen in adult or aged dogs and cats, than young ones.

Tuberculosis among carnivorous animals, especially the domestic dog and cat, is more frequently seen in cities than in country districts, and I believe this to be due to the fact, that city animals are more confined, and the opportunity for infection of the disease from human sources is so much greater. It is the consensus of opinion of those who have made careful study of tuberculosis of the dog, that the source of infection is nearly always of human origin.

POST MORTEM EXAMINATION of animals that have died from the effects of the disease is the safest, and usually the easiest meth-

od of determining the tuberculous nature of existing lesions; but even in such cases a microscopic and bacterial cultural examination are almost indispensable to enable us to differentiate, with certainty, between tuberculosis and other morbid conditions, which occasionally show a remarkable similarity. I am thinking principally of lymphatic sarcoma. The determination of true tubercle bacilli in a tissue or secretion absolutely determines the diagnosis of tuberculosis.

In all instances recorded in this paper, such examinations have been made whenever the disease has been found in a new species, and in all doubtful cases.

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### SUPPURATING AND SCHIRROUS CORD\*

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C. A. CARY, Auburn, Ala.

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The parts involved in suppurating and schirrous cords may be the stump of the spermatic cord, the tunica vaginalis, the cremaster muscle, the skin, fascia and sometimes the branches of the external pudic vein and artery and abdominal vein and artery and sometimes the walls and openings of the inguinal canal. Occasionally the pathological changes may extend into the abdomen and involve the peritoneum and other structures.

The causes are somewhat variable and may be mixed. Irritation of the cut end of the cord is designated by many as the most common cause. This is said to be a common sequel of clamp castrations. The clamps irritate and hold the cord down until it becomes attached by inflammatory adhesion to the lips of the castration wound and then infection follows as a more or less constant sequel. It is, however, possible to have healing occur with the cord attached to the skin and fascia without having a suppurating cord or a schirrous cord. Hence, it would appear that infection is an essential causal factor. It seems plausible that infection is the primary or chief cause of a majority of suppurating and fibro-suppurating cords. Cord ligatures are often followed by infection and fibrous development of the cord regardless of the length of the cord. This occurs in cases where the ligature is not absorbed or the

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\*Read before the State Veterinary Medical Association of North Carolina, June 27, 1917, at Charlotte, N. C.

end of the cord does not slough off as it should do and thus permit the ligature to pass out of the wound before it heals. I have seen cases where the castration would be healed and the silk ligature remained on the cord without showing subsequent suppuration or fibrous formation on the cord. This again points to infection as a chief if not a primary cause.

I have observed that suppurating and fibrous cords are quite common sequels of castration in horses and mules when blood clots are left in the scrotal sac or in the inguinal canal. The clot may supply food for pus germs or it may become organized into thrombus-like material and eventually become organized and fibrous. This may explain why so many fibrous or suppurating cords followed castrations when the old ecraseurs and emasculators were used and they so frequently failed to stop the hemorrhage from the spermatic artery. I am inclined to place infection as the chief or main cause and all others secondary or less in frequency and in effect. A long cord may be more easily infected and irritated. A blood clot favors infection and if not expelled may lead to a fibrous growth. Dr. R. C. Moore reports two cases where fibrous and varicose cords were found by him in the abdomen and he attributed the cause to irritation.

A suppurating cord may be differentiated from a fibrous cord or a fibro-suppurating cord. A suppurating cord is one that periodically or constantly forms and discharges pus for more or less long or intermittent periods after the time when an ordinary or average castration wound should heal. I have known some cases of suppurating cords to discharge pus more or less continuously for one to three years. I have also known other cases to periodically form abscesses, erupt or be opened, the cavity heal and leave an enlarged cord and in three, six or twelve months another abscess appear, erupt or be opened and heal as in the previous instance. In one case repeated periodic abscesses appeared until I removed the fibrous and infected cord.

There are cases where there may be found a rather large quantity of rather dense fibrous tissue and here and there small pus centres. There are also cases where little or no pus centres can be found and the enlarged cord is almost entirely fibrous.

It may be well to note a few predisposing conditions or cases. Some horses are predisposed to excessive fibrous growths from all kinds of wound healing. Such cases are systematically or consti-



tutionally predisposed to the formation of fibrous cords. Other cases are prone or very susceptible to abscess formation and hence suppurating cords are more readily produced in them by infection. The following kinds of infection are reported by various observers: (a) *Micrococcus pyogenes*; (b) *Micrococcus ascoformans* (*Botryomyces*); (c) *Streptococcus pyogenes*; (d) *Bacillus coli*; (e) *Actinomyces*.

Some observers state that the large coccus (*botryomyces*) in some way stimulates the production, growth or proliferation of fibrous tissue and that when it is present as the infective cause fibrous tissue predominates in the enlarged cord. This, however, has not been my experience. The ordinary pus germ (*Micrococcus pyogenes*) is the most common infection of all varieties of enlarged cords following castration of horses and mules. In no case have I found *actinomyces* and only a few cases of (b), (c) and (d).

*Symptoms and Diagnosis:* As a rule most authors do not think it possible to differentiate a case until some three to six months after castration, yet it is sometimes possible to find a fairly well developed fibrous cord in four weeks after castration. This is especially true in pigs or hogs. Another peculiarity about enlarged cords in hogs is that they are very vascular and not infrequently sarcomas. The enlarged cord may be determined by grasping the scrotum between the thumb and fingers and then feel up along the cord toward the external inguinal ring. The enlarged cord may extend up into the inguinal canal and in rare instances into the abdomen. The enlarged cord may be largest down next to the scrotal skin or it may be spindle shaped and large in the middle and in rare instances it may be largest above in or near the inguinal canal.

If the cord is infected and suppurating there will be a fistulous opening near or in the castration cicatrix. This is the inferior termination of the fistulous tract that extends from the deeply seated pus cavity, in the enlarged cord, to the surface. This may be an old tract and it is usually surrounded by connective tissue. This has led many to believe that it is the stump of the cord attached to the skin. Hence, the old idea that a fibrous cord is always caused by a long, irritated cord attached to the skin wound. Constant or periodic discharge of pus may be seen on or over the hind limbs. Sometimes there is an odor but never is the odor as characteristic as in necrosis of bone or of teeth. Some authors have

stated that enlarged cords produce edematous enlargements of the hind limbs; but I have never observed this in a single instance in horses and mules. Others state that weight traction on the cord reflexly produces stringhalt and other reflex nervous symptoms. I have not observed such symptoms. However, large abscesses or very large fibrous cords will produce more or less impediment—lameness in the hind limb. As a rule an abscess or tumor along the cord does not press on the large blood or lymph vessels of the hind limbs. In some cases there may be some edema of the sheath and abdomen. This is, however, very uncommon.

*Treatment:* Prevent it by taking off as much of the cord as possible in castration and by checking the hemorrhage with a good emasculator or ecraseur and by preventing or avoiding infection. Small enlarged cords may sometimes be sloughed out with caustics or removed with a curette. Primary suppurating cords may sometimes be completely relieved by careful opening and disinfection; yet most of these cases are prone to recur unless the enlarged and infected cord is completely removed.

*Operation:* The instruments required are scalpel, artery forceps, vulsellum forceps, silk thread and needles, and sterile gauze or bandage for packing. The horse is prepared by withholding all feed for one or two days (not by purges) and during this time cleanse and disinfect the scrotum and hind limbs. An hour before the operation the horse is given 8 to 12 drams of chloral hydrate in capsule or in solution through a stomach tube (not per mouth as a drench). The horse may be confined upon an operating table or cast and placed on his back as in ordinary castrations. The hind legs pulled apart or spread and the scrotal and inguinal region cleansed and disinfected. I prefer soap and sterile water and cotton for cleansing and then use iodine solution for disinfecting. Cut so as to take away as much of the skin as will remove the old scar. The opening should be 4 to 5 inches long. Cut down through the fascia or fibrous adhesions around the base of the enlarged cord. Grasp with the vulsellum forceps and with the left hand (or an assistant) produce strong or heavy traction on the enlarged cord. Use the fingers to determine the limits of the enlarged cord and cut close to the cord. When possible tear the attachments of the cord away with your fingers. The pulling on the cord will pull it out between the branches of the external pudic and abdominal veins and arteries and when you tear, and cut close to the cord

so pulled out, no large vessels will be cut or torn unless they are included or pass through the enlargement. If large vessels are cut or torn, ligate them; but this is seldom done or required. After cutting and tearing away the attachments from the enlarged part of the cord, the normal cord will be found free in or near the canal. Pull the cord out as far as safely possible and sever with an emasculator if possible or with an ecraseur. If hemorrhage demands it, pack the cavity with sterile gauze bandage and close the wound with continuous sutures. Remove the sutures and packing in 12 to 24 hours and treat the wound by washing and daily disinfecting only the external parts. Handle otherwise as an ordinary case of castration.

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## THE TREATMENT OF TETANUS.

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Tetanus is due to the *Bacillus tetani*, sometimes called the bacillus of Nicolaier, because it was discovered by that scientist in 1884 and isolated in pure culture by Kitasato in 1889. Tetanus is a pure toxemia. The bacilli of tetanus may exist indefinitely in the tissues and no symptoms will be exhibited unless toxins are formed. If the toxins alone are injected into the body the characteristic symptoms of tetanus will be produced though no germs of the disease are present.

There are two poisons developed by the *Bacillus tetani* belonging to the ptomain group, tetanin, and tetano toxin; both were discovered by Brieger in cultures of the *B. tetani*.

The *B. tetani* exists in soil that is infiltrated with animal excrement and is therefore more common in the older settled regions and in warm climates.

Ashurst and Johns report that in twenty-three cases of tetanus treated in the Episcopal Hospital of Philadelphia in ten cases the wound was infected by country earth or street dust, two by floor splinters, five by rusty nails or spikes, three due to machinery accidents and one each to gunshot wound, puerperal infection and explosion.

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\*Read before the Illinois State Veterinary Medical Association, National Stock Yards, Ill., Jan. 18 and 19, 1917.

When the *B. tetani* gains entrance to the animal body, usually through a wound and develops, toxins are formed that ascend the nerves by way of the axis cylinder and possibly through the peri- and endoneurium to the spinal cord. Some of the toxins also enter the general circulation.

The *B. tetani* is an anerobic organism, a small punctured wound preventing access of air is therefore particularly favorable to the development of the organism.

Unfortunately there are very few recent veterinary statistics available from which satisfactory conclusions can be drawn as to the results obtained in treating tetanus. As a rule only those cases that recover are reported in the veterinary journals, so we must rely largely upon statistics from the field of human surgery. The great war now being fought in the older settled regions of Europe and in the trenches where the soil is contaminated with human and animal excrement has supplied most of the data that I shall freely quote.

**TREATMENT OF TETANUS IN ENGLAND.** The most satisfactory exposition of the treatment is contained in a little booklet, Memorandum on the Treatment of Injuries in War, Based on Experience of the Present Campaign, July 1915, published by the Royal Army Medical Corps. It is given in full, as it seems to be the best single comment on the methods available. It will be noted that the administration of tetanus antitoxin, and particularly the intraspinal method, is the method of choice.

**"TETANUS.** The heavily manured soil of the districts in which fighting has occurred frequently contains the spores of tetanus bacilli; these, in many wounds, are driven deep into the tissues and may find there the anaerobic conditions suitable for their development. Should the bacilli establish themselves in such a wound they give rise to toxins which have a great affinity for nervous tissues and produce the well-known symptoms of the disease.

**"PREVENTION. A. General Measures.** The steps advocated in other parts of this pamphlet for the cleaning, dressing and drainage of freshly received wounds, as well as for their appropriate surgical treatment, with a view to minimizing the risks of sepsis, are those which, if fully carried out, will also minimize the risk of tetanus. They need not, therefore, be further described here.

**"B. Special Measures.** These resolve themselves into the prophylactic use of tetanus antitoxin, a proceeding of well-established value.

"Prophylactic Use of Tetanus Antitoxin. Since in the first two months of the war more cases of tetanus occurred than had been anticipated, either by ourselves or our allies, it was decided to direct that a preventive dose of serum should be given to every wounded man in place of leaving this, as had been done at first, to the discretion of the medical officer. The results have been excellent, and, in the last six months, there have only been 36 cases of the disease among those who received a preventive dose of serum within twenty-four hours of being wounded. That this is not due to the possible absence of the cause of infection from the soil is clear from the following facts: (1) Bacteriological examination of the wounds has often proved the presence of tetanus bacilli, although no tetanic symptoms have followed. (2) Many instances of slight trismus, or of localized tetanic spasms of a muscle or a group of muscles, have been reported, without the subsequent development of generalized tetanus. (3) Thirty-four cases of severe tetanus have been reported in this period among the very small fraction of wounded men who, for one reason or another, had not received a preventive dose of the serum within twenty-four hours.

"The general use of preventive inoculation of the serum has also had an effect on the severity of the symptoms if, in spite of the preventive dose, the disease should subsequently develop. For example, of the 34 cases mentioned above, which did not have a preventive dose within twenty-four hours, 32 died, a case mortality of 94.1 per cent.; whereas of the 36 cases which occurred among the enormously larger class of wounded who had received a preventive dose, 28 died, a case mortality of 77.7 per cent.

"Influence of the Duration of the Incubation Period on the Severity of the Attack. The general experience has been, as was to be expected, that the shorter the interval between the receipt of the wound and the appearance of the symptoms the smaller the chance of recovery. At the same time, cases have recovered in which the symptoms appeared six days after the wound, and cases have proved fatal where nineteen days had elapsed. The average incubation period of 43 fatal cases was 8.83 days, and that of 26 cases which recovered 11.57 days.

"TREATMENT WHEN THE DISEASE IS ESTABLISHED. A careful study has been made of 179 cases in which certain particulars which had been called for were furnished. Of these 179 cases, 140 have died, a case mortality of 78.2 per cent. Although this figure is dis-



appointingly high, it must not be forgotten that the majority of these cases were also suffering from severe forms of sepsis, and in a considerable number of them the reporting officer stated that the tetanic symptoms had completely subsided under treatment, the patient dying from septicemia, gangrene, secondary hemorrhage, or other causes.

"A. Local and Surgical Measures. Steps should be taken to open up and clean the wound, if this has not already been done, and the freest possible drainage should be secured. The local application of strong antiseptics, swabbing with pure carbolic acid, the free use of hydrogen peroxide, and similar measures, have been tried, but appear to have had little influence on the course of the disease. Surgical interference of a grave nature, such as amputation of a limb, has been carried out in a number of instances; but such cases have almost always died, though not necessarily from the severity of the tetanic symptoms.

"B. General Measures. The patient should be kept in a perfectly quiet and darkened room, maintained, as far as possible, at an equable temperature. The avoidance of all external stimuli, likely to start a spasm is to be aimed at, and some have advocated the bandaging of the eyes, the plugging of the ears with wool, the placing of the feet of the bed on rubber disks, etc., with this object in view. It is of great importance to maintain the strength of the patient by means of adequate fluid nourishment, given in small quantities at frequent intervals, and by the rectum if swallowing tends to induce spasm.

"C. Use of Anesthetics and Sedatives. As regards the former, chloroform is most commonly used, though ether has been preferred by some, especially when required for a small operation or for the dressing of a painful wound. Their value is well recognized. As sedatives, chloral hydrate, potassium bromide, and morphin are most frequently used for the purpose of controlling spasm, the first named being the most valuable. They are of undoubted value in this direction, but do not appear to modify the course of the disease to any great extent. Too frequent or too large doses may do harm. Chloretone, in doses of 30 to 40 grains in olive oil, given by the rectum, has been well spoken of for the same purpose of controlling spasms.

"D. Carbolic Acid Method. This has been given a trial in a considerable number of cases, usually in combination with tetanus antitoxin, but the results have been disappointing.

"E. Magnesium Sulphate. It has been used in this war chiefly by the intrathecal method, but, like carbolic acid, has not proved reliable.

"F. Tetanus Antitoxin. This is the only treatment as to the employment of which there has been anything like general agreement. It has been used in one form or another in almost every case, and when cure has resulted it has commonly been given the credit. Whatever method be employed it is clear that three general principles must be observed to obtain the best results: (1) It must be employed at the earliest moment possible; a dose of 1000 to 1500 units given at a time when there is little more than a fear that tetanus may develop, may influence the course of the disease favorably. (2) It must be given in large doses, and these should be frequently repeated until the symptoms show definite signs of amelioration. (3) It must be kept up, although in smaller and less frequent doses, well into convalescence, in order to obviate the tendency to relapse.

"The most favorable results appear to have been obtained by the employment, in the first instance, of the intrathecal combined with the intravenous methods, the subcutaneous method being used to reinforce the others in the succeeding days or to replace them as the symptoms diminish in intensity.

Sir David Bruce gives the following summary of the cases treated, in the English Home Military Hospitals, *Lancet*, August 4th, 1914 to July 31st, 1915—231 cases mortality 57.7. August 1st, 1915 to July 31st, 1916—195 cases; 99 recovered, 96 died, 49.2%—77 of these cases had received prophylactic doses of tetanus antitoxin, 33 died, 42.8%.

If symptoms appeared within ten days of receiving the wound, the mortality was 81.5%. If between 11th and 25th, the mortality was 52.2%. Fifty-five cases, 26 to 330 days, 27.2%.

More cases developed on the eleventh day after injury than on any other although the period of incubation varied from four to 330 days.

In fifteen cases tetanus followed operations. In three cases symptoms appeared in twenty-four hours and one within two days. No prophylactic dose of tetanus antitoxin was given. The mortality was 40%.

"On Operative Interference after Tetanus Symptoms Have Appeared. There is a great deal of difference of opinion as to

whether a wound should be actively interfered with after the onset of the symptoms. It seems under the circumstances to be the most natural and rational to open out and clean up the wound and thus get at the cause; on the other hand the tetanus toxin may be leaking very slowly into the nerves and the operation may open up a large new absorbent surface. On this account there are many surgeons who deprecate interference with washing out the wound as thoroughly as possible and waiting until the tetanic symptoms subside before resorting to more heroic measures.

On the whole the evidence seems to be in favor of waiting until the tetanus has been got under control, and the blood and tissues are flooded with antitoxin before undertaking any drastic interference with the wound."

"Among the 195 reported there were only 21 cases operated upon. The mortality among these was 47.6%. No definite conclusions can be drawn from these."

Sir David Bruce says that there appears to be no particular advantage in the intrathecal method of injection. Out of the total 195 cases the number treated with antitoxic serum after the onset of the symptoms was 175. Twenty cases did not receive antitoxic serum in England. Of these six recovered and 14 died; mortality 70%. Of the 175 cases treated with serum, 92 recovered, mortality 47.4%.

"All evidence goes to show that antitoxin is the more effective the earlier in the disease it is given. This is proven in diphtheria and it is also probably true for tetanus. In order to give the antitoxin a chance, therefore early treatment should be striven for and if this were done and the antitoxin applied thoroughly one would not despair of reducing the mortality to say 20% instead of 50% at which it stands for the past year.

During the year twenty-two cases were treated by injections of carbolic acid; mortality 68%. Eighteen cases were treated, the mortality was 78%. He says there is no evidence that any benefit accrued to the cases treated by carbolic acid or magnesium sulphate injections".

The recommendations made as to treatment are: Place the patient in a quiet darkened room under the care of a capable sympathetic nurse. "Rest, sleep and food" are the first essentials. Large doses of tetanus antitoxin of high potency should be injected as soon as possible. "The patient should receive sedatives

of which morphine, grs.  $\frac{1}{4}$ , every four hours is perhaps the most suitable''.

These suggestions correspond with our own experience in the treatment of tetanus in animals.

The treatment of tetanus in animals naturally resolves itself as follows: 1st. To prevent the development of the disease.

The prophylaxis consists in administering tetanus antitoxin 500 to 1500 units depending on the size of the horse and the length of time that has elapsed after the wound has been infected. For an average horse and a fresh wound 500 units is sufficient. After 48 hours 1000 units should be given and four days following the wound 1500 units should be given. While tetanus antitoxin is not an absolute preventive of tetanus it is practically efficient and should always be given in suspicious wounds or the owner advised as to its value and cost and the responsibility placed with him. The wound should also be promptly treated as described later. It must be remembered that tetanus antitoxin does not affect the toxin that is already locked in the nerve cell. Its only function is to neutralize any further toxin that is formed and thus inhibit the progress of the disease. For this reason it is advisable to inject the antitoxin directly into the circulation.

We should advise giving 5,000 to 10,000 units of tetanus antitoxin intravenously just as quickly as the disease is diagnosed. The animal should be placed in a comfortable, quiet, dark box stall. If it can swallow, give laxative food, particularly gruels with milk and raw eggs. Even when the jaws are partially set the animal will often take considerable nourishment if the receptacle is placed conveniently. Always give the wound good drainage and give free access to air. The wound should be washed out with hydrogen dioxide and packed lightly with an efficient antiseptic. We would advise Chlorazene, Dakin's new antiseptic, as it is a powerful oxidizing agent. A 1% solution should be used on gauze, packing the cavity lightly and moistening the gauze every two or three hours. Do not use caustics or too strong antiseptics on the wound. As a sedative, lobeline sulphate is probably the most satisfactory. It can be administered in  $\frac{1}{10}$  to  $\frac{1}{5}$  grs, every twelve hours or every six hours as conditions warrant. This allays the excitement and stimulates excretions. Chloral hydrate can be given per rectum. Do not try to dose the animal per orem. Mor-

phine should be avoided on account of its exciting effect on many horses.

One of the problems in treating tetanus is the quantity of antitoxin to be given and the frequency of the dose. The experimental evidence is that tetanus antitoxin is all eliminated from the system in eight to ten days. It remains in a practically undiminished amount for about seven days and rapidly disappears in one to two days. It is generally considered that tetanus antitoxin is more efficient as a curative agent in horses than in man. This is attributed to the fact that the antitoxin is an homologous horse serum, and also to the better technique of administration in horses.

After the preliminary injection of a large curative dose of tetanus antitoxin only additional small doses are needed, say 500 or 1,000 units every other day for a week. By the end of the first week one can generally prognosticate the case, and if it seems advisable another large dose of antitoxin can be administered.

Personally I do not favor the use of slings except in unusual cases or where the animal is of such a disposition that they can be used to advantage. In a majority of cases they aggravate the horse, in some cases, however, slings are indispensable.

This then is the rational treatment of tetanus based upon our present knowledge:

1st. Give a large dose, 5,000 to 10,000 units of tetanus antitoxin as quickly as possible. Time is very important. Treat the wound with oxidizing antiseptics, give drainage and allow the access of air. Use sedatives, particularly lobeline sulphate. Good nursing, that shall furnish food and water with the most complete rest and quiet are very important factors. With this treatment we should expect more than 50% of recoveries.

It is also important that a convalescent animal should be given plenty of time for a complete recovery. The reconstruction of the nerve cells takes place slowly.

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—Dr. R. M. Graham of the University of Kentucky at Lexington, has been appointed Professor of Animal Pathology in the College of Agriculture and Chief of Animal Pathology in the Experiment Station of the University of Illinois, Urbana. He is a graduate of the Iowa State College and is well known for the work he has done on forage poisoning.



## TICK ERADICATION\*

E. I. SMITH, Baton Rouge, La.

The work of tick eradication in Louisiana commenced as far back as 1906, and was financed by the state,, through the aid of an appropriation in favor of the State Crop Pest Commission; it being decided at that time that cattle were a "crop" and ticks were a "pest".

As a result of this start, not much was accomplished, for the time appeared to be too early to inaugurate a campaign of "greasing" the cattle all over the state. Two parishes, at that time, commenced operations: namely, Lincoln and Claiborne. Lincoln dropped out the next year on account of so much opposition being developed by her people. Claiborne continued and worked without furnishing any cooperation along the lines of inspectors, until 1912. In this connection, the U. S. Bureau of Animal Industry and the State of Louisiana furnished all of the assistance. Of course, it shifted the responsibility from the citizens to a small army of men who were not in a position to do anything more than strongly urge and timidly resort to the courts. As a result of such conditions, a few ticks were left in Claiborne, and they have continued to spread and allowed to go uncontrolled. Therefore, the first of last March, that parish was placed under State and Federal quarantine.

In 1913, 1914 and 1915, the parishes of Madison, Tensas and East Carroll were released accordingly, which, at the present time, constitutes the entire amount of released area in the State of Louisiana.

Last year, in 1916, eight parishes worked systematically in the State, dipping their cattle every 21 days, but, as a result of such long periods of dippings, none of these parishes were able to be released from quarantine. This year, we are working 20 parishes, and the new ones are dipping their cattle every 14 days, and it is estimated, through the cooperation we are now receiving in the State, all of these 20 parishes will be released from quarantine this coming fall, providing they continue to cooperate throughout the season.

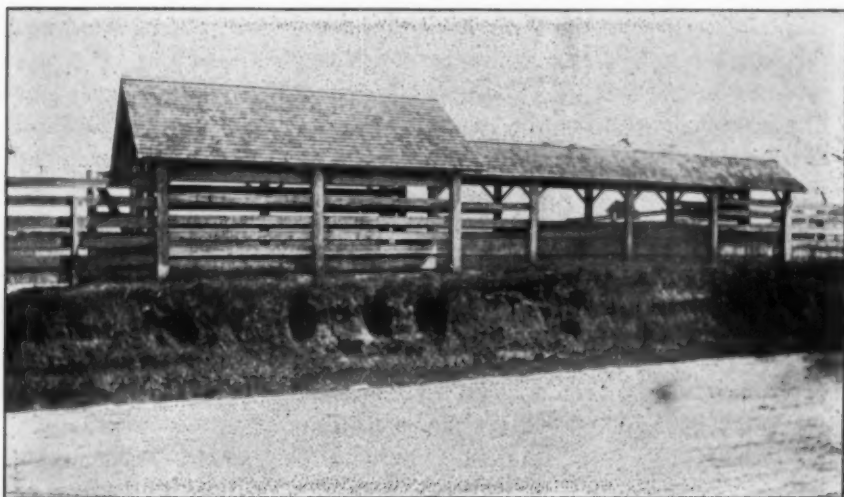
In the Spring of 1916, the State Legislature unanimously

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\*Summary of remarks made before the members of the Cut-Over Land Conference of the South, New Orleans, Louisiana, April 11, 12, 13, 1917.

passed a State-wide tick eradication law to become effective in 1918. Only a few weeks previous to such action, the State of Mississippi passed such a resolution, and, as a result of these State-wide resolutions being passed to eliminate the dreaded cattle tick, Arkansas and Texas have followed suit, which means that an ultimatum has been signed whereby the tick must go.

At the present time, in travelling over the State of Louisiana, there seems to be united opinion that when 1918 arrives every parish will be ready and willing to commence an active campaign against the tick. In this connection, the Louisiana State Live Stock Sanitary Board had declared its intention to work every parish



1. A Model Dipping Vat on the grounds of the Louisiana State University.

next year, providing the Bureau of Animal Industry can assist, and, so far as I am able to state, we believe they can. When the State is ready and wants to do the work, we believe that to be the opportune time to organize the forces accordingly.

Already, considerable money has been spent in Louisiana for the eradication of the cattle tick; that is, from 1907 to 1915, the State spent \$43,000; parishes, \$100,000; and the Bureau of Animal Industry, \$93,000, and from April 1, 1916 to December 31, 1916, the State spent \$10,000; the parishes, \$47,000; and the Bureau of Animal Industry, \$30,000.

Last year, our records show 1,516,081 dippings in the State of

Louisiana under the supervision of inspectors, and that was all under the 21 day system.

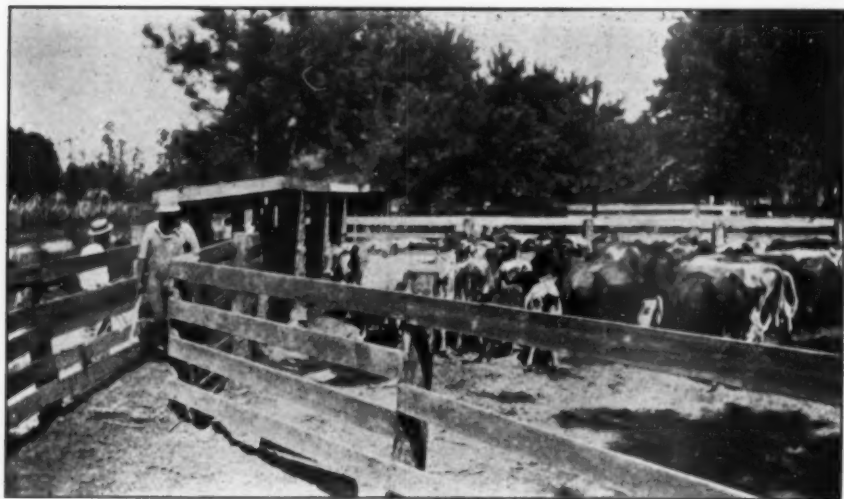
During the year of 1916, our office at Baton Rouge sent out to various citizens in Louisiana something like 65,000 pieces of literature pertaining to the eradication of the cattle tick, and, so far, we have received a large number of replies, which indicate that the communications were kindly received. This Summer and Fall, as the time will permit, it is our intention to send out double that amount, which will go to parishes which contemplate doing systematic work next year.

This season, there will be in operation about 1200 dipping vats in the parishes doing systematic work, and from 20 to 25 tons of arsenic will be required to charge such vats. In each one of these parishes, there is located a government-trained veterinary inspector who has complete supervision over the work in the parish, in co-operation with the State Live Stock Sanitary Board and the Police Jurors. In this connection, the parishes furnish from four to ten local inspectors—men chosen for their integrity, ability to handle other men, and devotion to the work. After a few weeks' service, these local inspectors become very expert, as a result of being trained, and their work carefully supervised from day to day. Each inspector is furnished with a chemical testing outfit, and he is shown how to determine the quantity of arsenic in each vat, so that it will not either become too weak or too strong, which, in either instance, would be useless.

In 1906, the U. S. Government commenced an educational campaign throughout the Southern States in co-operation with the state officials along the lines of tick eradication. In those days the dipping vats were not heard of and the only method available for the destruction of the cattle tick was to gather the cattle in a pen and make an effort to grease them with some preparation of black oil or any other greasy substance. This was accomplished by a swab on the end of a stick and you can imagine the difficulties one would meet in undertaking to grease 1,500,000 cattle, as our records show were dipped in 1916, in one season. At that time, when this first move was started, the people throughout the South were skeptical and did not believe that we would be able to complete the eradication of such an insignificant pest as the cattle tick. Therefore, their question was, "Can it be done"? This brought back a reverse answer, from the average class, very emphatically,

"No"; but things are changed materially today, and the question that now confronts the people is that they are asking the government and state when they can have their co-operation to assist them in cleaning up the cattle tick. The experimental period has passed and now, as over 300,000 square miles have been cleaned up and released, the people are aware of the fact that the project has gone far into the practical stage, and the demand for the work throughout the southern area is causing larger appropriations every year from the Bureau, State and local officials.

This year, the State of Mississippi is planning to clean up every county, so that cattle from now on may have a clean bill of



2. Dipping Cattle.

health wherever they may move intra or interstate. There is not a Southern State that has cattle ticks within its border which is not working strenuously to completely eradicate them, and it is estimated that this year's work will be successful in cleaning up about 100,000 more square miles.

Congress is appropriating, at this time, between \$600,000 and \$700,000 to help such areas that desire to help themselves.

Since the work of tick eradication started, the States of Kentucky, Tennessee, Missouri and California have gone completely above the quarantine line, and, the way conditions now appear,

it would be safe in saying at the close of this year the States of South Carolina and Mississippi will also be placed above the line.

A considerable amount of money has been spent on tick eradication in the Southern States since the start, but, when one stops to consider the great number of cattle in the area and the increase in valuation from dipping alone, the original figures spent for the eradication of the cattle tick will sink into insignificance when brought into comparison. Farmers in Mississippi, Alabama and Tennessee had the privilege of expressing their opinion as to how much the valuation of their cattle was increased after dipping, and their average replies were between \$7.00 and \$10.00 per head.



3. Dipping Vat in Pine Woods of Louisiana.

The cost of dipping in any parish or county, according to our figures, run from 23c to 50c per head, and, even if a parish has to spend on an average of \$1.00 per head to eradicate the ticks, it is an investment that should not be debatable.

This year, we have been handicapped somewhat on account of the lack of State funds to meet the demands of the work in Louisiana. When the legislature wisely passed the new State-wide Act, they failed to make sufficient appropriations for the complete carrying out of such a law. There are now a number of parishes already working which are not receiving State aid. They were advised, in the Spring, as to the condition of the State's finances and



some of them proceeded, in spite of such lack of funds, to furnish the entire co-operation. It is not right for the State to help some parishes and not help others, but, under the present appropriation, it becomes absolutely necessary. We have one parish in this State, which, during the last 45 days, has built over 50 vats, and, so far, the State has been unable to assist them. With the interest already in view, and the number of parishes that are being called on to work next year, it is imperative that the State have more money to assist along this line, as the time to do tick eradication is when the people are ready, and we have every reason to believe that every parish in Louisiana will lend their undivided efforts in 1918 to the complete eradication of the cattle tick. State funds will be necessary in order to meet every little demand in the way of inspectors and incidental expenses. The State should have a general travelling inspector to assist in the supervision of the work and whenever some miscreant dynamites a vat the State should have sufficient funds to offer a reward for his capture and conviction.

Mississippi will clean up her territory this year, and next year we hope to have the advantage of a trained force from that State to supervise the work in Louisiana. We now have twenty-six men on the federal force of this State and they are thoroughly trained along the line of tick eradication.

It is evident that the Bureau will have enough men, parishes will be ready, and the only drawback will be the lack of State funds, and if the people of Louisiana wanted the advantage of such assistance, they should put the matter squarely before the finance committee of the State Legislature and demand that such appropriation be liberally increased.

At the present time, there appears to be a great desire on the part of Louisianians to purchase a better grade of cattle, which, of course, originates in the tick free areas. However, in spite of the fact that such cattle die after being infested with the cattle tick, the enthusiasm on the part of the buyers is still increasing. Louisiana is recognized as a State which can grow all kinds of grasses and yield any class of food suitable for cattle. Therefore, as tick eradication progresses and the lands become cleared from timber, the sentiment in favor of increasing the number of cattle in the State grows accordingly. I know of 6,000 head of cattle which will leave the State within the next 30 days for Texas, where they

will graze this season and later be finished for the market. This is a condition which should be changed, for in various parts of this State one can ride for miles and miles over cut-over timber lands that are growing an abundant amount of grass and apparently going to waste for the want of cattle to graze upon it. If these 6,000 head of cattle could be distributed over Washington, Tangipahoa, St. Helena and Livingston parishes, it would certainly mean the commencement of a rejuvenation.

The interest in this State is now very keen, and, so far as we are able to observe, the only drawback this year has been for the want of funds by the various parishes. If there could be some or-



4. Dipping Cattle.

ganization formed whereby those parishes could be loaned a fair sum of money at a reasonable rate of interest, it is believed, as a result, we would be working a considerably greater number at the present time than we are already cooperating with.

The great area of cut-over timber land at present is a perplexing problem. It is land that is lying idle, growing back to shrubbery and weeds, and, in a number of cases, that I have had an opportunity to observe, the only use that is made of it is to stock it with goats. If capital will permit, it is believed that if the timber interests will buy up large numbers of cattle, placing them in charge of a competent herdsman, and graze them on the cut-over lands, that there will

be almost no end to their revenue and advertising they will receive accordingly. Of course, feed must be raised in the Summer to support the cattle in the Winter, but if it can be done by a few individuals in the case of 5,000 or 6,000 cattle, it is believed it could be done by the lumber interests with a much larger number to feed.

The cattle industry has come to stay and statistics indicate that for the next quarter of a century to come they will hold their own in price or materially advance. When anyone travels over these great areas of timber lands, he cannot help being impressed with the beautiful lay of the land. It is rolling, well watered, and located in a climate which offers every advantage a man could desire. Nature provides everything—even food, raiment and shelter—which are the three great assets of mankind.

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—The National Association of Bureau of Animal Industry Employees has, by a referendum vote among its branches, decided not to hold its annual convention this year.

—The semi-annual meeting of the Genesee Valley Veterinary Medical Association was held at Albion, N. Y., July 25. Papers were read by Dr. J. L. Wilder, of Akron, Dr. Dodd of Canandaigua, Dr. McClelland of Buffalo, and Dr. Cleaver of Avon. Operations were also performed upon eight patients at the clinic.

—The deaths of a number of farm animals have been reported at Porterville, Calif. Veterinarians, who made post mortems, declare the animals were poisoned. One rancher reported the loss of eight mules valued at \$2,000.

—Newspapers report that Dr. W. Horace Hoskins recommends the conscription of horses in the large cities to prevent the shipping to Europe of "green" mounts fresh from the West, on the ground that the city horses, as a rule, are seasoned and noise-broke and less liable to certain diseases than the "green" horses.

—A Woman's Auxiliary of the Philadelphia branch of the American Red Star Animal Relief has been organized to help raise funds for a veterinary hospital in that city.

—Dr. Gustave A. Kay of the Bureau of Animal Industry has been transferred from Omaha, Neb., to Shelby, Iowa.

## ITEMS IN RECENT HISTORY OF VETERINARY MEDICINE

JAMES LAW, F. R. C. V. S., England.

Emeritus (Late Dean and Director) New York State Veterinary College  
Cornell University, Ithaca, N. Y.

(Continued from page 674)

BLACKLEG, EMPHYSEMATOUS ANTHRAX, BLACKQUARTER. This like the genuine *anthrax* is remarkable in that the germ, once introduced into wet, undrained, and dense, impermeable soils tends to maintain itself there for a great length of time or permanently. The microbe (bacillus of blackleg), 3 to 10 microns long, is distinguished from the bacterium of anthrax by its rounded ends, the microbe of anthrax having square or cupshaped ends, by the frequency of a spore in one end (making it clubshaped) or in the middle, by its unreadiness to live in circulating blood where oxygen abounds, by its avidity for certain acids notably lactic, so that its abundant haem-albuminoid exudate gives off a distinctly sour odor, and a gas that accumulating under the skin makes the part crackle when handled, it further differs from *B. anthracis* in not finding a congenial home in carnivora and omnivora (cat, dog, pig, bird and man).

The tendency of these two germs to survive in dense, damp, or rich soils, places them in a class with *Bacillus tetani*, and other such microbes, having dangers all their own, and requiring a prophylaxis peculiar to themselves. Neither of them possesses the contagiousness which places it in the list of pestilences spreading by mere proximity of stock, but each has its own special danger, arising from its localization in soil, and the difficulty of dislodging it after it has once secured a soil habitat. A common plague can be stamped out with its victims, and, after disinfection the seat of the outbreak may be perfectly wholesome for others, but these enzoötics with an earth-habitat have come for a prolonged stay and, when permitted to interfere with the uses of the land may become even more destructive or ruinous because more continuous. We can render such land sanitary by expensive underdraining, aerating, and a sufficient delay before using it again for stock, but this takes time and the loss of crop after crop, in addition to the heavy outlay, may reach up to the entire cost of the land or more. In this, too, the chief offender is not necessar-

ily some lordly taxgatherer who exacts his ever growing dues, that he may lay in store the earnings of his skillful and industrious people and spend a lifetime in making and hoarding new engines of destruction, and in training his yearly increasing conscripts and launching them at the opportune moment on his unsuspecting and unprepared enemy, to grinding him under his august heel, and establishing his dynasty as world ruler. On the contrary, the offender in this case is but a plain, respectable dealer, not himself a breeder nor improver of live stock, but a mere pedler, who exacts his tax on every transaction, and by natural habit of thought ignores the harm that his actions impose on the community. He can buy cheaply from infected lands, can turn his purchases along with others, the more the better, on wet, dense-soiled growthy pastures; he can afford to lose some at times but goes on complacently hiring a new clean pasture and proceeds to infect it in the same way. His business is to turn over his stock to a purchaser at a good profit, and he can't be expected to keep them, while in his hands, in a place he knows to be infected, risking at once his own property and the interest of his prospective customer. Thus he goes on uninterruptedly spreading a deadly infection over pasture after pasture in the dense, wet clay or overmanured rich soils, where it will last indefinitely. In the past people took with what complacency they could command the inevitable stock plagues that followed in the wake of every great war waged on the European Continent. In this peaceful and favored nation, however, we must follow with critical eyes the actions of the accommodating dealer who holds in his hands the means of desirable improvements in our, as yet imperfect, herds, to see whether he is really contributing to the improvement or the destruction of our live stock and their pasture lands. As pasture after pasture becomes infected, we have to see that our own stock and meadows do not suffer from the water-shed from infected pastures lying above ours on the same slope, that the creek does not bring down to us in our water supply, the deadly germs stored up on the slope above us, that dust storms do not carry the germs onto our land and that the buzzards, and other scavenger birds and vermin, do not drop their infected prey where it will do the most harm. Even breeders of improved races of stock have to be watched with equal care. With the high prices paid for their yearly increase they can afford to pay for the *immunization* of their whole



herd including those that they offer for sale. They suffer no losses in their own herds so we are encouraged to buy in confidence, but discover later that this trust was misplaced, when we find that not only has our nonimmunized stock suffered but that our pastures, which have hitherto justified our confidence in their purity from plague-infection, have become suddenly and in a sense permanently seeded with an intractable and deadly plague. We can of course follow in the footsteps of the seller and ourselves immunize our herds, but in doing so we have loaded ourselves with a new obligation for expenditure, which cuts our profits, and worse than all we have made ourselves a new and active spoke in the wheel, which promises to carry the infection farther and farther as years go on.

To deal fairly with the question of *immunization* we must note one by one the various recognized methods of accomplishing this:—

1st. There is the old method of *inoculating a drop or two of the active virus in the dense tissues at the tip of the tail* (after the fashion of inoculation for lung plague). This simply produces a localized blackquarter, in a cold season, in a dense tissue with limited circulation and no loose connective tissue in which the abundant morbid exudate can take place, so that the germs can undergo but a limited encrease, and meanwhile the leucocytes are busy, producing defensive materials which soon bring the pathogenic germs to a standstill. If, in exceptional cases, under the action of *bruising, antipyrin, acetanilid, potash, alcohol, common salt, proteus vulgaris*, or *Micrococcus prodigiosus*, or other sedative or irritant, the swelling extends unduly the tail can be cut off, well above the seat of inoculation, and the stump treated with an antiseptic bandage. So far as the animal operated on is concerned this is effective, but when employed in a place previously free from blackleg, it furnishes a most promising prospect for the planting of the deadly germ in such land as a permanent pathogenic crop. It should therefore be strictly confined to land already infected, and the live stock kept on such fields, with the further proviso that such stock must not be moved to other land nor premises for a length of time, and that no drainage can take place from this newly infected land to any other. Further this land must now be treated like other blackleg territory and abandoned for raising food or litter for cattle and sheep.

Second. Thomas (Verdun) cultivates the germ in the body of a frog, dips sterilized threads in the exudate and inserts them, sub-

cutem, near the tip of the tail. The same precautions must be used as when the virus is used in the same situation, direct from the exudate in cattle. The open wound and the risk of other (pus) germs favor a freer discharge and a readier planting of the germ in receptive soil. It contaminates the soil. There is also more danger of introduction of other bacteria with fatal effects.

Third. *Arloing's method*. The affected tissue from the newly killed victim is cut out with carefully sterilized instruments and hands, dried, powdered, mixed with sterile water to form a thick paste, and enclosed in an incubator at boiling temperature for seven hours. In the absence of spores this ought to be sterile and equivalent to a mixture of bacilli and defensive materials. It is given in a dose of  $1\frac{1}{2}$  grain mixed with 15 drops of sterilized water injected subcutem generally in the tip of the tail. A second preparation made at the same time from the same material, is subjected, in an incubator, to a temperature of 90°F. for 7 hours. This is not given subcutem until 10 days after the first dose. The second dose cannot be trusted to be perfectly sterile. It rarely harms the partially immune animal operated on, but if spores are present these may escape death and seed and infect the land. Like other methods this protects the herd operated on, but cannot be counted on to protect the soil. Unfortunately even experimenters have usually drawn their conclusions from the question of efficiency or inefficiency on the herd operated on, and not the protection of the soil and of vulnerable animals which may thereafter be turned on such soil. For animals on already infected soil, and to be left on such soil thereafter, it works well. But, in case of its infecting soil previously clean, it may become a means of spreading the infection to other soils and animals.

Fourth. *Kitt's Method* is virtually a counterpart of Arloing's, but without the first, *sterile*, injection. It is open to the same objections. In regard to both, if the system of the animal is already charged with agents rendering it more vulnerable (*lactic acid*, *sarco-lactic acid*, *potash*, *common salt*, *alcohol*, *antipyrin*, *Proteus vulgaris* or *Micrococcus prodigiosus*, or toxins of either of the last two) the inoculation may prove fatal. Both carry the danger of infecting new soil or of re-infecting or doubly infecting the old. So that both should be avoided (if they may be) where the locality is still uninfected.

Fifth. The Bureau of Animal Industry followed Kitt in using but a single nonlethal (not necessarily noninfecting) injection. The lesion from a blackleg case, is taken with due precautions pounded in a mortar, to form a homogeneous semiliquid mass. This is spread in a thin layer in a glass dish and subjected in a thermostat to 95° to 99°C. for six hours. The resulting thin scale must be again mixed with water for injection. It will be noted that this heat is insufficient to kill the spores (110°C.) so that we are again dealing with an infecting product endangering both a susceptible subject and the soil. It has, however, "*proved exceedingly helpful in preventing disease*". It has, however, proved unsatisfactory so that a still newer product is now promised, but as its actual nature has not yet been revealed it is still impossible to pass judgment on it.

Sixth. *Intravenous and intratracheal injections* of virulent serum from the acute blackleg lesions have been resorted to on the ground that the abundance of oxygen in the blood and bronchia would check proliferation of the anaerobic germ and produce a safe prophylaxis, but the dangers attending the injection are so great and the escape of the germ from the air passages to infect the soil is so uncertain that neither has secured the acceptance of the profession and the public.

Seventh. *Roux* sought to escape the dangers of a living (even if attenuated) germ by passing the serum from a blackleg lesion through a Berkfeld filter and using the sterile filtrate only, for inoculation, but the confessedly great dangers from accidental infection has prevented its general adoption.

Eighth. *Kitt* secured immunization by inoculating once only with dried virus which had been subjected for six hours to live steam (colorless) at 100°+ C. This has the merit of avoiding the diffusion of live spores on noninfected land, but it has failed to secure general acceptance.

Ninth. In different outbreaks, since 1880, I have taken the blood from the sick live animal, or one just dead, and heated it for over an hour in a water-bath at 100°C., then broken up the coagulated mass in well boiled water, filtered the material, through a sterilized cotton cloth, and used the filtrate for inoculation in a dose of 2 drams, repeated, on the second day. Great care is taken in maintaining the boiling temperature for the full hour: then inflaming the upper part of the container to clear anything adherent,

that may possibly have escaped the full action of the heat; to see that hands, instruments, and all articles used have been thoroughly sterilized; and to dip the hypodermic nozzle in strong carbolic acid each time just before inserting it.

It is not asserted that this method is infallible, but it has served me well, and I feel certain that it will do equally well with any one who will be as careful. It uses the endotoxins prevailing in that particular herd, together with what defensive agents have been formed, and thereby escapes all the possible evils of a mistake in diagnosis. It almost infallibly escapes any spores of special vitality and resistance, as spores are rarely found in the blood during life, and are not likely to harm the subject inoculated. The temperature has been amply sufficient to kill all living bacilli, so that there is no danger of their escape to infect new soil through feces or urine carried to it. This last provision is further and more effectually taken care of by the fact that the method is only carried out in a herd and on land *already infected* and with this particular brand of the germ, so that its adaptability to it is well assured, and all possibility of error excluded.

It carries out what I have been particularly pleading for: the use of the identical germ acting in the disease before us, with its toxins and the defensive materials adapted to it, and not to some other pathogenic germ; it makes use of no living blackleg germ, and cannot add therefore to germs or spores that may be already present in the bodies of the inoculated, or in the soil or premises where they are kept.

The inoculated are of course under order not to be taken from the premises or pasture. There is always the possibility that some contain germs in their systems or on their surface, or, as stated under *foot and mouth disease*, in *nonvascular, necrotic, fibroid, calcified, or degenerated structures*, in *foreign bodies or organisms, living or dead*, and these may escape to contaminate *susceptible subjects, soils or places*, but at least, *all such dangers were present before inoculation and cannot be charged upon that operation*.

Again it must be allowed that this inoculation does not exclude the possible presence of *lactic acid* and the other agents named as increasing the vulnerability and inviting deaths that might otherwise be escaped. Such agents are accidentally present before the inoculation, and are in no sense dependent on the operation. The keeping of the herd on the premises should at least rather counter-

act all unnecessary exertion, and thus obviate the formation of the powerful, vulnerant *sarco-lactic acid*.

It must be further allowed that the strongest resistance (immunity) is usually to be derived from a casual infection with the disease itself if that proves to be nonfatal, and that the *measure of potency* in resistance is not to be expected when the injected materials are confined to the dead germ, its toxins, and the defensive matter found in the blood, as in the case we are now considering. By this restriction to the products of the germ and the defensive body cells not only is the potency of the defense lessened, but the duration of the *immunity shortened* so that this form of *immunity* is usually designated *passive* instead of *active* or *persistent*.

But even with this qualification is it not well worth while to substitute this more transient immunization for the other even if that is more persistent? We secure a protection, variable in duration, but always enough to protect against immediate illness and death, we escape all the deaths that occur from the direct, operative introduction of the virus, and we escape all dangers of the extension of that virus to other susceptible animals and to lands and premises that were previously uninfected, we escape therefore all possible extension through our inoculation and its consequences. Look for a moment at the contrast. A herdsman or breeder has been long at work to build up the herd of his ideal, and that his business demands. Among other things he has sedulously kept clear of blackleg. But suddenly through purchase, or some other unsuspected channel, the germ finds its way into his herd and one animal dies of unquestionable blackleg. His veterinarian (probably a government inspector) makes a *post-mortem* examination, diagnoses blackleg, and proceeds at once to inoculate the whole herd, using the active virus as well as the defensive agents and thereby *saves the herd*. But the pasture is a heavy clay, at places wet or even marshy, and like a good farmer, he has not spared fertilizers, including that from his herd of inoculated cows. All goes well for a time, and he congratulates himself that he has got over the trouble. But as the young calves are weaned, go out on the pastures and grow there, first one, then another, and another die of blackleg, then if at all versed in the subject, he begins to suspect that the hope of immunity is unfounded and that the plague has got planted *for good*, or rather *for ill*, in his pastures. What must he do? Inoculate all his young stock with the too well founded expectation that from this



time on he must go through the same taxation, anxiety and possible loss, yearly, for an indefinite period? Sell out his farm and home, then, if he can, secure another at a price commensurate with his means, and start anew with much loss and no little tear, wear, and anxiety? Tear up his pastures, underdrain them thoroughly and wait for years until they have become porous, aerated and clear of the living germ, his stock meanwhile being kept on sound hired meadows until time and immunity shall assure him that he need no longer fear blackleg on these drained acres? In any such case, has he a right in law or equity to compensation for the planting of blackleg on his farm and for all his attendant *avoidable* outlay?

I will doubtless be told that the respectable and universally trusted laboratories are careful enough to see that no immunizing agent sold is capable of planting such a deadly germ on a *germ-free* farm. On the contrary, my careful study of the subject has failed to find a single preparation in regular use against blackleg that is free from the active virus, capable of planting blackleg in any receptive soil. With the great number of serum laboratories now in the market all commercialized and in strenuous competition with each other, can we hope that all will hold themselves so far above mercenary motives as to make all their products above suspicion? In glancing over their advertisements, I find that they mostly hold out that their products are of the "highest potency", "highly potent", "guaranteed of high potency" and the like, but few care to tell in what this alleged potency consists. *The most potent in immunizing* being usually those that introduce the active living virus, it is reasonable to assume that in this their potency consists, but this is precisely what we have reason to dread as a means of planting blackleg in new fields, and opening more of the national estate to its sway. Then if they fall back on the national license as guaranteeing their freedom from anything objectionable or harmful, we have only to quote the B. A. I. as authority that the foot and mouth disease epizootics of 1902 and 1908 started in the products of such laboratories, and nothing is more notorious than that the same infection was widely spread in 1915 by anti-hog-cholera products of these laboratories. It is manifestly impossible for the federal government to oversee and control the now numerous biological laboratories so that the license can be looked upon as little more than a permission to sell freely what they can produce. Results have shown only too clearly that the license cannot be taken as guaranteeing the safety and harmlessness of the product.

In the case of the malady now before us (*blackleg*), its control and restriction must be sought in a much more comprehensive supervision. Through its meat inspection and the inspection of markets and stockyards the government may trace out most of soil infected areas in the land, make an accurate census of the cattle and sheep on such places, and put the owners under bond to sell no such animals without permit and without a public registration of the sale and purchaser, and for what purpose the sale was made. If for slaughter, that should be under government inspection and report. No sale should be made to a pedler, but only to butcher, breeder, feeder, or dairyman, who will be obliged to hold the stock for one month under federal registration and supervision, and the purchaser must be notified that they come from a *blackleg* source so that he may not turn them on clean land to contaminate it. Such purchasers, like the original owners, must be placed under bond not to sell these cattle except at the end of the quarantine, and the holder of the animal, be he original owner or purchaser, must be held responsible for any such animal as may disappear from his herd. In some such way it may be possible to keep control of all cattle and sheep on *blackleg* land, until it can be thoroughly dried and rendered germ-free and wholesome. To this end the government (federal or state) could advance money for drainage under mortgage on the land, and the germ could be gradually hedged in and exterminated as a public benefaction. Such an outlay of public funds would be in the nature of a paying investment which would pay a liberal return in the future, an altogether better employment of the funds than in munitions of war and the slaughter of the trenches, the submarines and the dirigibles, and not to be compared in any way with our *pork barrel* outlay for impossible ports and alleged navigable rivers, (but *really for the benefit sub rosa of the congressman and his friends.*)

**ANTHRAX.** The genuine *anthrax* becomes localized and *enzootic* in the same class of soils as does *blackleg*, but it has a very much wider range of victims, including all domestic animals, many wild animals, and even man himself, so that its invasion of damp, dense, wet, and rich soils is less easily controlled and its ravages much more extended. Being actively aerobic, the bacterium, 4—even 20 microns long, by 1 micron broad, sporulates readily when exposed to warm air, and, as the spore is more resistant to disinfectants and other destructive agents than that of *blackleg*, it is much more likely to sur-

vive out of the body for a great length of time. Rivers, like the Delaware below Trenton, which receive the waste water of large tanneries, using foreign and domestic anthrax-hides, become heavily charged with the spores, and the bottom lands, frequently overflowed, become so saturated with the germs that domestic animals cannot live there, without immunization. The same is common of smaller tanneries situated farther inland and the tanners have habitually paid for the animals that died. The disease is often spread by animal products imported from abroad (hair, bristles, wool, horns, sinews, etc.) Imported food stuffs are a common origin, and it may be difficult to trace these after they have been eaten, and when attention has been drawn to the sudden deaths of the animals fed. The dry hides being so light are often packed above food materials and infect the latter while at sea. However introduced, the germs are largely spread by insects, as well those that are predatory on animals as those that prey on the food.

If seen in life, the victim is usually found apart from the herd, standing with depressed head, stupor, or if moved, staggering, temperature  $106^{\circ}$ – $107^{\circ}$ F., mucosa bloodshot, may be oozing blood, feces blood-stained or streaked, may show colic, or bloody urine.

If found dead (the usual case) oozing blood in the nose, around the anus, the extreme dark color of the blood generally (it brightens little or not at all in the air), the presence of dark bloody engorgement, in mucosæ, or of dark blood on their surface, the presence of petechiæ or blood exudations in or on different tissues, an enlarged blood-gorged spleen, and anywhere the presence of bloody and gelatinoid exudations (subcutem, in connective tissue, in or between the muscles, subserous, etc.) If the germs are *inhaled*, the lesions tend to predominate in the pharynx, trachea, bronchia, pleurae and pericardium and lymph glands (wool sorters' disease); if *swallowed*, in the tongue, pharynx, throat, and intestines, (anthrax of tongue, pharyngeal, guttural, lymph glands, anthrax of stomach and bowels); if by biting insects, local cutaneous and subcutaneous anthrax (malignant pustule, etc.)

When the dose is large and potent, and the victim very susceptible, it is liable to kill without leaving marked local lesions (fulminant anthrax), or at most a blood-gorged spleen (splenic apoplexy). Such cases are usually found amidst others more or less localized and these latter serve to characterize them.

In case of uncertainty, the blood or serous exudate from a local lesion may be examined with confidence of obtaining a conclusive result. Sir John M'Fadyean dries on a glass slide a film of the suspected blood, and stains it for  $\frac{1}{2}$  to 1 minute with a 1% watery solution of methylene blue and  $\frac{1}{2}\%$  of sodium bicarbonate. The slide is again dried by pressing between two sheets of bibulous paper and then waving above a Bunsen flame. Under the microscope this shows a few leucocytes and many stained anthrax bacteria. The nuclei of the leucocytes show a greenish-blue tint, while the bacteria are of a deep blue. Around and between the bacteria is an amount of reddish-purple amorphous matter which is especially characteristic of anthrax.

The complement fixation and precipitation tests have proved less satisfactory in anthrax than in other infectious diseases.

*Prophylaxis and Immunization.* *Prevention and Immunization* are the prime resorts in dealing with an infectious disease common to man and animals and the germs of which can live indefinitely in dense, wet or overmanured soil as also in water, to be roused to a destructive career whenever susceptible subjects are brought within its range. The ideal management of such an affection is to circumscribe the affection absolutely, and to exterminate the germ so that the whole country and finally domestic and wild animals in the entire globe shall be delivered from the terrible menace that it constantly holds over us. What I have said on *blackleg* is doubly applicable to *anthrax*. The locating of anthrax-lands can be determined by tracing back from extended anthrax outbreaks and inspections of live and dead, the registration and quarantine of the infected herds traced out, and the penalizing of any sale or disappearance of any animal from such herd unless it be for slaughter under inspection, or the placing in safe quarantine until the animal can be confidently pronounced safe and harmless. Disinfection of all animals, and things on the infected premises and of all removed out of them is a natural corollary. The infected pastures and lands, where possible, must be subjected to thorough underdrainage, and for this the funds may be furnished by the state or nation and a mortgage taken on the redeemed land.

It is needless to repeat here what has been said in connection with *blackleg* and the attendant slaughter and disinfection, only to enjoin more rigid and far-reaching precautions, in keeping with the far wider range of the genera subject to the infection, and the more

redoubtable results of the disease. The need for accuracy is all the greater that the *Bacillus anthracis* is aerobic and must not be exposed to the air lest it produce its lasting spores and provide for its survival and future triumphs. If the carcass and products are not at once destroyed by heat, disinfectants, or caustics, all external openings of the body must be plugged with cotton saturated with antiseptics until the more destructive agents can be put to their effective use. So with everything that has come from the *corpus delicti*, especially from its interior.

Every imported material that might by any possibility harbor and convey the infection should be strictly excluded. We can grow our animal products at home, and even if the infection were not so dangerous and destructive to man and beast as in that before us, it is a poor economy to admit from Europe, Asia and South America those products that we can produce as cheaply, and save the cost of ocean carriage, repeated handling, and often a heavy tariff besides.

When *anthrax* has been detected in a herd, and a sick animal is available, it should be made to furnish protecting serum for the as yet apparently healthy members. Blood is abstracted from the victim and boiled in a water bath, with a cover so that the temperature may be uniform throughout for at least one hour. Boiled water is added and the blood broken up, so that its soluble matter may be drawn out. It is then strained through a close (sterile) cotton cloth and the filtrate used for injection. Objection has been made that this will fail to kill the germ, but it must be noted that the blood of the living victim contains *no spores*, but only the staff-shaped bacteria, which in water are readily killed by heat. The filtrate therefore contains only the toxic products, which rouse the leucocytes to produce the defensive material, and also whatever protective material has been already elaborated in the blood of the donor. It has further been alleged that these soluble protectives are ineffective in anthrax, but this is in contradiction of all experience of the disease. Recoveries constantly occur in mild attacks, and these can only take place through the operation of these defensive cell-products in checking the active proliferation and lethal action of the bacteria. The very *serum-virus, simultaneous* treatment, which these objectors advocate, is an appeal to the therapeutic powers of these efficient protectors. The question before us is simply whether we shall deliberately add to the deadly germs that may be already in the system and thereby run into danger of a fatal result, or if



we shall altogether avoid the introduction of living germs and trust alone to the introduction of the therapeutic and curative products which cannot plant the seeds of the malady. It is true that the living *Bacteria anthracis*, multiplying in the body and producing all the local and general lesions and symptoms of the disease, provided these come short of a fatal result, establish a stronger and more enduring resistance or immunity than if the attack is of a milder, perhaps scarcely appreciable, nature. But our duty has been only half done unless we take all precaution against the propagation of the germs in the pastures, it may be at first by the removal of the stock to indoors, where the germs can be taken care of and destroyed, instead of being scattered wholesale by their deliberate introduction into new animal systems, and indirectly into new and hitherto uninfected soils. The second resort is to dry and aerate the fields by effective underdrainage, but the full effect of this cannot be secured at once, and the good effect cannot be counted on before a year or two at least, and after time has been allowed for the death of the bacteria already planted in the soil. Meanwhile our injection of the defensive products,—alexins, antitoxins, opsonins, cytolytins, bacteriolysins, and the rest, together with the toxins, etc., which rouse the leucocytes to the habit of producing a better crop of defensives, are building barriers and defensives which protect the system for the present. The objectors recognize the dangers I have referred to, inasmuch as that they forbid the use of the living virus in animals showing an abnormally elevated temperature. Such cases, being already infected, are, they admit, liable to perish from the addition made to the virus. Is it not better and every way more rational to restrict our defensive injection to the sterile products and entirely *omit the living virus*? If we were debarred from measures whereby we might sanitize the pastures, soils, and water-supply, we might be excused for adding to the virus in the animals, and infecting new fields and water supplies, with a view of making the surviving herd invulnerable (or less vulnerable) in the presence of an enemy which we are (or then would be) bound to submit quietly to; but, if we have presented to us the task of exterminating one of the worst enemies of prosperity, of humanity, of animal industry, of the health of man and beasts; if there is open to us a feasible and very promising way of effecting this extermination, must we turn from the task and devote ourselves to the work of husbanding and preserving the evil?

The *simultaneous method* is, as we have seen, but a makeshift. It is anything but a thorough, radical and permanent way of dealing with anthrax. In his recommendation of it, Dr. Eichhorn claims "very favorable results" in the many millions of animals treated by it. He, however, acknowledges that the product deteriorates very rapidly when kept under usual conditions, and that "*great losses have resulted from the application of inert vaccines*"; that "*it requires two handlings before immunization is established*"; that the "*losses from vaccination are not insignificant*"; that "*standardization is often defective*"; that "*its application in herds where the disease has already made its appearance is apt to induce the disease through the reduction of the resistance of the animal during the development of immunity*", "*and should only be adopted in herds in which the disease has not yet appeared.*" In view of these serious drawbacks and dangers, it may well be exchanged for something at once more radical and safer. But for an uninfected herd in pasture or premises free from infection, there is surely a double and more potent reason why it should be shut out. The blindness of the simultaneous-method men is a narrowness of vision. They see only the preservation of the individual animals operated on, while they are quite incapable of looking beyond to see the many pastures, premises and herds, among which they have been steadily planting the destructive disease-germs. Taking solipeds, cattle, sheep and swine, the government statistics for 1913 give a grand total of 201,639,453 head, at a total estimated value of \$5,299,306,779. Though this leaves entirely out of account the smaller genera (dogs, apes, cats, goats, birds, etc.) all open to attacks of anthrax, it opens up an idea of our national interests involved, and of the future possibilities in case the existing undeniable anthrax-extension in the United States should increase to something approximating a general epizootic. Few other diseases when occurring epizootically have left as great a record of terror and human helplessness as has anthrax. In Grecian legend we have the destructive extension on the Plains of Troy when that city was besieged for ten years by the Greeks. The rich alluvion from the adjacent hills, the unhygienic camps, the arrest of beneficent cultivation, and the warm climate account sufficiently to us for the wholesale destruction of animals in general, tame and wild alike in the common death. In the plagues of Egypt again with a similar rich alluvial soil in the Nile Valley, as yet without the ameliora-

tion of dams, irrigation and artificial drainage, it was exactly fitted for an universal extension of the infection in "boils and blains upon man and beast", until it could scarcely be called a hyperbole to say that "all the cattle of Egypt died." The disease prevails along the Nile bottom-lands to the present day. A far more extended and enduring plague is that known as "The Siberian Boil Plague." Every word conveys a feeling of dread. *Siberia* the land of evil and punishment; *boil* like *blain* conjures up the *bubonic plague* of man and animals, long the terror of East and West; and *plague* conveying more than any of its synonyms the idea of crime and resultant penalty and suffering. Wherever the same conditions have concurred, we have seen, and up to to-day see, the same results. And to return to our own land in the wet lands of the Lower Mississippi and in the Gulf States to the east we find a steady progress of anthrax as the cattle industry expands and may I not add, as preventive measures favor the further dissemination of the germ.

As direct evidence of this dissemination I cannot do better than introduce some facts from Dr. Eichhorn's article of a year ago, on the experiments made at the Bethesda, Maryland Station.

Six cattle and five sheep were subjected to the *simultaneous* treatment by *anthrax virus* and *anthrax serum*. All survived. Three weeks later, *when immunization should have been complete and effective*, (and if they failed to become immune and had been exposed in an anthrax place they should have been mostly dead) they were subjected, *sub cutem*, to specially potent anthrax blood of a guinea pig, ( $\frac{1}{4}$  c.c. for cattle and  $\frac{1}{8}$  c.c. for sheep), while three additional cattle and two sheep had similar doses of the same anthrax blood and were kept as checks. All the animals without exception (*supposed immune* and checks) showed a marked rise of temperature showing that the *virus had taken effect*. Then as to the final result: All of the immunized cattle recovered, excepting one undersized, unthrifty calf which died six days after inoculation. Of the *immunized sheep* four died and one recovered. Of the *checks* or *control* animals all died of anthrax in a time varying from two to eight days.

If this experiment proved anything, it proved that the *simultaneous method* did not destroy the active, virulent, anthrax germs in the system though it had had a full survival and leeway of eight days, in certain cases, in which the defensive materials

could have operated on the living virus. It showed that the immunized cattle and sheep were not resistant enough to kill the inoculated germs since all showed an elevated temperature for a time after the virulent injections. It follows then no less surely, and without any possibility of fair dispute, that for this length of time these germs could escape from these living bodies, and contaminate places hitherto free from anthrax as well as any susceptible animals put into such places. In saying this I am not contending that the *simultaneous method* does not give a measure of protection to most of the animals operated on, but that if such animals are operated on in an *anthrax-free* place, they are furnished a good opportunity of infecting such place, and extending the area of anthrax infection. And be it noted that this extension of infection, if not deliberately planned by the Bureau of Animal Industry and other sanitarians in using their methods, is none the less brought about by the official work of such persons in seeking to control the number of deaths from infected and exposed animals. Can any one escape the conclusion that such sanitarians are, even if unthinkingly, making provision for propagating anthrax and extending the area of its infection? It remains then merely a question of opportunity how long it will take for anthrax to spread over all areas where the soil is favorable to its preservation. I do not for a moment suggest that it will remain permanently settled in every place to which it is carried. On soils naturally well-drained (sand, gravel, light loam, etc.) it will tend to be restricted or even to die out.

A year ago, at our annual meeting, Dr. Wintringham expressed apprehension that this *serum-virus* inoculation would serve to plant infection in theretofore uninfected areas and Dr. Gerald sought to assure him by quoting his own (Gerald's) personal record. "This year," he said, "I have '*vaccinated*' something like 10,000 head; I vaccinated 6,000 head on the range, *where there had never been any anthrax, and on this range we lost two head out of 6,000, using a commercial vaccine.*" He did not condescend to tell the meeting whether they died from inoculation, or if they died from contracting anthrax afterward. Purposely, or unthinkingly, Dr. Gerald evaded altogether the crucial question of the *diffusion of anthrax by simultaneous inoculation*. Colorado, where he operated, is not a state in which the conditions are favorable to the diffusion of the anthrax germ and of the extension of its area.

The Plains are mostly composed of sand *with a little clay*, and the natural drainage is so good and the rainfall so scanty that no agriculture, *not even hay raising*, can be carried on without irrigation. Even irrigation is greatly restricted by the scantiness of the water supply. Had the experience quoted been on the heavy impermeable clays of Mississippi, Alabama and Louisiana, it would have meant something. Coming as it did from dry, sandy Colorado, it was not even remotely pertinent to the question in hand. Dr. Gerald, however, acknowledges two deaths after inoculation. It seems as if these had been either overdosed, or were the subjects of the concurrence of a dose of lactic acid or other material that intensifies the action of anthrax, or finally that the anthrax germ, unknown in that territory until now, had escaped from his inoculated animals, with deadly effect upon the unhappy two. It is easy to read between the lines that even rainless Colorado could not prevent the escape of the prophylactically-imported germ. Conditions were not such as could preserve it, that was all. Dr. Eichhorn himself quotes the extension of anthrax last year in Mississippi where the new agriculture is being fostered by availing of the universally available fertilizing measure, the livestock industry. Dr. E. succeeded in stopping the disease, for the time, in the infected herds—he left no animal that had not been prophylactically inoculated—no one that was capable of *contracting* the disease. The question before us is, whether on these impermeable Mississippi clays the calves, born in the succeeding spring, will not, many of them, contract the deadly anthrax from the germs left over by the animals operated on by the *serum-virus simultaneous method*, the year before, and whether on lands so naturally adapted to receive and propagate the seeds of anthrax, anthrax will not be thus started in this way and later perpetuated and spread from these centers. Cases can be adduced without limit in these Southern States, of wetness and clay, in which anthrax has been introduced to a farm and district by the arrival of new stock and thereafter continued as a permanent cause of depreciation of the value of the land through its interference with the raising and dealing in stock, or through the expensive and troublesome alternative of the inoculating of each animal yearly or even more frequently.

This underlying question is so fundamental to the prosperity of the country that we cannot exercise too much care in its consideration and management. It is not primarily a question of what



would be most immediately remunerative to our profession, nor to the great establishments which devote their energies to the production of immunizing serums, defensive products and viruses. These are but subsidiary employments and their success is not to be considered as on a level with that of the great livestock industry and the interdependent agricultural profession, the source of the food, clothing, and well-being of the world. The veterinary profession as a whole can only flourish when the livestock flourish, and whatever loads down the livestock with unnecessary and unavoidable burdens and losses must rob the veterinarians of their returns. Prevalent infections must of necessity reduce the profits of the stockman and drive him out of his business, and as livestock decreases, the veterinarian must find his vocation unprofitable and uninviting, and so with the owners of biological laboratories in their turn. Prosperity must in the end depend on the soundness of the roots of the great industrial tree—the livestock possessions of the country, and when these are depressed and fail, their natural dependents, the veterinarians and laboratory workers must first go to the wall, while all other industries of the nation must suffer and sink in their turn.

We, as a profession, stand today on trial. If we keep our eyes fixed steadily on the only worthy object, the final extermination of all infections, and the possession of an earth without a remaining wasting plague, we can hope to hold our own with the gratitude and thanks of our fellowmen, but if we as a profession lose sight of this noble ideal and advocate and practice that which will contribute in any degree to the distribution and diffusion of plague-germs we must look for increasing dissatisfaction and distrust and content ourselves to be only fit to be abandoned and left out, in the march of the future progress.

These words are especially called for when we are dealing with diseases like *blackleg* and *anthrax* which are not alone germ-diseases but in which the soil itself becomes an infected medium, in which the germ proliferates, multiplies, and spreads indefinitely as it does in living hosts. The limited view which would confine the application of its protective measures to the living infected herd, and that by inoculating it with a *weakened, attenuated virus* which would immunize the well, on sound pastures must be abandoned; the prophylactic agent may be *sterile toxins, antitoxins, opsonins, or defensive proteids* from some known, or as yet un-

known source, wherever you can find an agent at once effective and yet inoffensive; we must on no account use the living virus of the infecting disease which may under any possible condition, in a new living host, in congenial earth, or anywhere else have its vitality and virulence restored, and its power to arouse a world devastating pestilence renewed.

*Autotherapy*, literally cure of one's self, is seemingly better fitted to an assembly of hypnotists or faith curers, than to an association of veterinarians. Nevertheless, every animal and for that matter, every plant is by nature endowed, within given limits, with a power of *self cure*. From our earliest days we are having this power demonstrated in the spontaneous healing of the wounds and bruises, abrasions and incisions, by the process of scabbing or adhesion, the decoloration, solution and removal of extravasated blood or serum, and even in the repair of broken bones and ruptured tendons or ligaments, so that we become prepared to expect similar repairs in the deep-seated structures as well as in the superficial. When we entered the study of the living body we saw in the whole, a mass of microscopic living cells pervading every tissue, and constituting the active nutrient, functional, and metabolic centers of each. These cells are like so many centers of active work by which the different tissues are kept in normal form and activity, and by their sleepless activities the body as a whole is fitted to maintain a continuity of life, and of all the multifarious processes that render a healthy existence possible. One function is dependent on the healthy exercise of another which preceded it, and the beneficial outcome is equally dependent on another that must follow it, unless the whole body system is to go to wreck for lack of suitable food, from the supply of ill adapted or improperly prepared food elements, from the use of similarly unfit products for secretion; from their inadaptability to produce those myriad metabolisms which are indispensable to the vital functions of other and distant organs in the body; and, finally, for the appropriate preparation of used up materials so that the excretory organs can cast them out of the body, and free it from the accumulation of deleterious and dangerous reserves and retentions. The least defect or shortcoming in the work of any cell or group of cells, if it cannot be repaired and remedied, is a constant threat and peril to other cells interlinked with this in function. If self repair were impossible to each cell, what a mass of ruin the body must soon have become and how short the period of its survival.

When we realize that each cell, from the first, is endowed with the power of repair, not only of its own structure, but also of the tissue over which it has direct control, we have before us a splendid and practically almost illimitable field of prophylactic and therapeutic endeavor. And under the influence of such a spectacle how wide and rich the invitation to avail of these all pervading natural powers to carry on our professional duties. We can change an unhealthy and unhealing wound into a healthy and healing one by adding sound epidermic cells or a graft of deeper tissue as well; we can combat a vicious or defective metabolism, by restoring the healthy function of a distant organ on the healthy function of which the anabolism of the first was dependent, or such distant metabolic organ might be obtained from a young animal and grafted into the body of the subject having the defective function; a defective or disordered liver may be rectified by a graft of a pancreas, or a defective hypophysis by a graft of thyroid, and so with other vicarious or substitutionary glands. We can even stimulate by increasing circulation in the controlling gland, and thereby arousing to action the defective one.

We can call into play the products of the living cells, nuclein and nucleic acid to restore a failing vital activity in defective cells, and thereby secure healing or even a new vitality and service.

But what interests us even more, and should be ever present to our minds as practitioners, is the universal operation of curative action on the part of the cells in recovery from disease, and above all things, recoveries from microbial diseases. The disease has attacked its victim violently and has advanced in the same manner to a crisis, and then it abates and progresses to a more or less speedy recovery. It is quite evident that, in all such cases of recovery, the invading morbid germ has been met by a successful antagonist, and, with our knowledge of the body cells and their services in the healthy system, it is obvious that recovery must have been operated through the body cells as well. In the self-limiting contagious disease this explanation is fully borne out by the invulnerability of the recovered system under a second infection. The cells are no longer actively susceptible to, and vulnerable by, another dose of the microbe but show a strongly antagonistic attitude to the poison, and this lasts for a length of time and in many diseases for the remainder of life. It has long been obvious that this antagonism cannot be attributed to any

simple chemical product laid up in the body, as that would have been exposed to constant solution in the lymph and blood, and to removal from the system. The remedial agents and the immunizing ones must come from a continuous action of the cells which charges the circulating fluids with the resisting material, and keeps up a constant supply. If, by and by, the immunization gets worn out, it is because the cells have lost their acquired function of producing defensive materials, but this function is acquired once more when the cells are called on to again subject themselves to and contend with a new and successful attack, or are subjected to the effective toxins of the invading microbe. With an experience of this kind before us from the remote date when such diseases were first known and recognized, to the present day, who could close his eyes to the fact that it is the defensive chemical products of the disease-invaded cells that establish the immunization? This clearly apprehended, and the way is open to deal with such diseases by autotherapy, whenever the attack is such as to make the attempt admissible. Two conclusions are necessary to harmonize with facts observed. *First*: The microbe attacks the cells by its poisons (toxins, enzymes). Even in those cases in which the microbe enters the interior of the cells, it produces the toxins as before, and until the cells perish they continue to produce the antitoxins or defensive materials. *Second*: The invaded cells produce their defensive materials, in the form of antitoxins, etc.—*chemical bodies* and not living organism—bodies that cannot multiply by reproduction. In order therefore that immunization may be at all lasting, it must be by a *habit acquired by the cells*, one which once acquired is persistent for a time at least, as habits are liable to be. We have before us the only rational basis for a *safe autotherapy*. *In the first place* the living microbe can be dispensed with since the *sterilized toxins* will still, *though non-vital*, arouse the cells to elaborate the *defensive agents*. *In the second place* these defensive agents, from whatever cause produced, antagonize the microbes, or even kill them, and check or arrest their deleterious work of producing toxins. Where the autotherapeutic elements are procured from the animal suffering from the disease, the infecting liquid (blood, lymph, serum, pus or other exudate) is divested of its living microbe, by passing it through a Berkfeld filter, or by heat, or by both, and the *now sterile liquid is injected sub cutem*. This cannot produce the disease since it contains no

vital, living germ. It can be conceived that when in *great excess* it may destroy life by the potency of its toxins, but in the absence of any living, proliferating toxin making organism, it can neither start the infection in the animal injected, nor produce a self-propagating malady in other susceptible animals. In the absence of any infection the *chemical protective agents* from the cells, together with the defensive matters normally present in the blood and other liquids of the animal operated on, will far more than overbalance on the right side any killed microbes and toxins that may exist in the small amount of liquid injected. So far then as the subject operated on is concerned, the resort is usually quite safe as well as effective.

A dim prescience of the value of such a resort may have been connected with the very old adage "A hair of the dog that bit him" though this was more commonly applied to the slave of an alcoholic or other narcotic habit who in his effort to reform, and his sudden abstinence, found his suffering more than he could bear, he must have one slight indulgence more, for this last time only.

In the earliest days of bacteriology various observers, (Chauveau, Toussaint, Pasteur, etc.) undertook to produce immunity by injecting germs robbed of *part* of their potency (*attenuated*), by heat, light, or a prolonged rest in an inactive condition, or in an insusceptible or unfavorable system. This was apparently successful in many cases. The chief objection to its use is that justly made to the *serum-virus (simultaneous method)* that the attenuated germs, fresh from remarkable successes, in the hands of Toussaint, when tested at the Alfort Veterinary College upon what proved to be very susceptible subjects, led to a succession of fatalities. The system was at once generally condemned. Such a series of *sudden deaths* in test animals, was too severe an example. Yet what is to a large extent a counterpart, the inoculation, by Pasteur, of men and dogs, with a live virus attenuated by a prolonged resting in light and dry air, was visited with no such censure because, the *inoculated subjects survived*, and the weakened germs escaping from such *inoculated*, planted the seeds of the dread disease and maintained it year after year in France, America and other lands where Pasteur Institutions were maintained. Nor has such blame been visited on the *simultaneous method* of inoculating with *serum and virus* to immunize swine against hog cholera; the inoculated herd is usually saved, while the virulent seed is scattered



widely, and if where susceptible swine are found, the disease abounds later.

Roused by such warnings careful observers had a clearer vision, which penetrated the delusive surface-garb of *seeming good*, to perceive, beneath, the prolific evil of seed scattered everywhere and growing up in ever increasing pestilential harvests. It was plain to them that no plan nor system was good or safe, which preserved the seed to grow up later into an all pervading evil crop. Those endowed with this clearer vision advocated *hyperimmunized serum* or this combined with *killed bacteria*, sub cutem, in any case where the herd has been exposed to infection but not yet showing fever nor acute symptoms of the disease. Both these may be given in large doses as neither contains living germs, which can cause the disease in other susceptible animals. In case there are already sick animals in the herd, these should be at once removed, the pens thoroughly disinfected, and the patients treated with large doses of *hyperimmunized serum alone*. Should they recover they should then take the treatment with *killed bacteria* and should be kept in strict seclusion (quarantine) for one to two months. Before release they should be subjected to surface disinfection and all necrotic parts or foreign bodies (possible culture flasks or preservers of microbes) removed.

I have already quoted my use of sterilized virus, in 1880, as an immunizing agent in hog cholera. See also *Law's Veterinary Medicine*", vol. IV. pp. 15-20, 214, 255, 281-3, 726, 727).

*Autotherapy* is most rationally and safely applied by administering, sub cutem, the virus of the sick animal, first diffused, and cultivated for twenty-four hours in a normal salt solution at ordinary room temperature, then sterilized at 212°F. passes through a Berkfeld filter, and then injected into the animal from which it was taken. This contains toxins, bacterial enzymes, and defensive matters produced in the infected body, but after sterilization no living germ,—nothing that can convey the disease to the animal operated on nor to any other,—nothing that can plant living infection in ground previously sterile. The animal operated on has the same infection and cannot well be injured by the toxins of the very few germs originally derived from its own infected body. These germs are weakened by twenty-four hours removal from their rich food in the tissue juices and blood of a susceptible animal, and by the comparatively much lower temperature of the room, than of

the living animal host. There has been also the drawback of the defensive matters contained in the virulent liquid, with some addition and modification wrought by the tissue or blood cells that were contained in the blood or exudate derived from the sick animal, which in themselves must have put a rein on the pathogenic activity of the exiled germ. The best testimony is the often almost miraculous effect that it has in cases suited to its use. Cases of long standing, intractable, by all other treatment at once take on a healthy action and close up and heal with incredible activity. So marvelous and undeniable were the results in many cases that one could deal gently with an enthusiasm that seemed to carry its advocates beyond the bounds of reason, but it was so evident that in this we had struck a lode of unusual value that the overzealous ought not to be too much hampered by opposition, until experience should show where the real limits of the new departure should be drawn.

Dr. Charles H. Duncan of the Volunteer Emergency Hospital, New York, the devoted leader of the new cult, warmly advocates the method for septic and suppurating conditions generally, his zeal not stopping short of using crude pus administered by the mouth as a dog licks his wound and secures rapid healing through limitation of bacterial growth and products, while availing of the *defensive materials* produced on the surface of the wound by the living, defensive leucocytes. He recognizes the limitation of other wound-infection bacteria by the prompt removal by the tongue, and the antivirulent operation of the products of the defensive cells on those few that remain on the sore. He quotes remarkable examples of the antivirulent action of the injected defensive products, on deep-seated pockets of purulent or septic microbes, the existence of which is a constant source of infection that operates in keeping up active disease elsewhere. He further adduces cases of poisonous proteids (ivy poisoning) not in any way dependent on infective microbes, against which a satisfactory immunity was established by feeding the ivy leaves to a milch cow, and having the ivy-poisoned patient drink her milk. From this Dr. D. argues the prophylactic value to man of the milk of cows or goats that have been fed the virus of contagious diseases. In the same manner he feeds to nursing women the infecting products of children's diseases that the antibodies in the milk may antagonize and immunize against such diseases (bronchitis, tonsillitis, sinusitis, rhinitis, pharyngitis, pneumonia, boils, abscesses, furuncles, rheumatism, appendicitis, gastro-

enteritis, etc). Prior to parturition he would place the subject on the milk of an immunized animal that she might pass through the danger period of child bearing without risk.

Veterinarians taking up the matter hopefully have been equally optimistic and claim equal measures of success. Numbers merely catch the pus in a spoon which they rub on the tongue that the animal may swallow. Obstinate and long intractable poll evils, fistulous withers, quitters and other pyogenic diseases, have undergone prompt improvement and recovered in the ratio of 100 per cent. Dr. D. J. Mangan, in charge of the Department of Street Cleaning, New York, claims that he saves in this way many horses that would otherwise have been shot as incurable. Dr. W. R. Grutzman, Veterinarian to the 15th U. S. Cavalry claims 100 per cent cures in the horses and mules having purulent infections. These might be added to at will.

The method is being adopted in all parts of the world and is most favorably reported. When carefully manipulated so as to see that sterile products only are used, it may be resorted to freely in all suitable cases.

*Limitations of Autotherapy.* The widely extended success of any method of treatment should not warrant its use in a reckless manner. Even self-therapy, though based on the all but universal truth of the protective power of the living body and its cells against invasions by infectious agents may easily be resorted to in such a way as to bring only failures or even fatalities. Infectious diseases which attack with great suddenness and extreme violence like *fulminant anthrax* allow no time nor opportunity for self-immunization, and inoculation of exposed stock with even the sterile toxins and antitoxins will often be attended with danger. The animal taken from the same herd and operated on, may be already infected and the addition of the phenomenally potent toxin may be the means of sealing his fate. To guard against such an accident any candidate for operation should be first carefully examined to make sure that all bodily functions are still healthily and normally active and above all that there is no elevation of temperature nor other manifestation of fever. With a hyper-acute attack of a specially deadly infection, the presumably lethal toxins should be debarred, and no product from a diseased animal administered unless the protective blood serum can be secured to be given alone.

Again no disease the germs of which can survive in the soil

of pastures, prairies and other lands, should be used even when taken from mild cases to be given in crude form to an animal from which it may escape into the receptive soil. This includes such diseases as blackleg and anthrax unless exhaustive precautions are taken to see that no live germs can possibly escape from the sterilizing chamber.

Again diseases that are not decidedly self limiting are poorly suited for auto-therapy. Glanders and tuberculosis in animals, like syphilis in man are so slow to establish immunity in even the most favorable circumstances that autotherapy could only be carried out at considerable risk. The English Cavalry and Artillery have long found it easy to keep clear of glanders by excluding all diseased purchases and shooting all that showed the disease after purchase. It would be equally easy to purify our city stables but without rigid and inflexible measures the disease is bound to prevail indefinitely. We cannot any longer assert that there is never a recovery from glanders nor tuberculosis. There are undoubtedly mild attacks of either disease which the victims outlive so as to make an ultimate recovery, but both are so liable to develop in occult forms that the preservation of the victims and above all their stabling in the same premises with other stock is sure to lead to extensions of the affection.

The manifest disposition in both the medical and veterinary professions to resort to the use of the crude (unsterilized) disease products cannot fail to bring discredit on the operators and on the system of treatment. It cannot be denied that in many cases marvelously good results have come from following this course. This is plausibly explained by Dr. J. J. Sellwood, of Sellwood and Besson, General Hospital, Portland, Oregon. "In process of filtration the infectious element of the pus is eradicated and the immunizing free toxins employed, *just as when given by the mouth the stomach digests the infectious element and sets the toxins free in the general circulation.*" "*Pus by the mouth is applicable only to those infections that are not in any way connected with the alimentary tract and respiratory system.*" We can accept Dr. Sellwood's facts based on long years of hospital experience, without adopting in full his explanation. With our everyday experience, that proteids like peptones, that are deadly when injected directly into the circulation or tissues, are harmless and nutritious after passing through the unbroken mucosa of stomach and intestine, we

can find a better and more generally applicable explanation of the harmlessness of bacteria toxins after passing through the same healthy mucosa. The toxins are free enough and poisonous enough in the infecting liquids ingested to prove fatal when given in sufficient quantity. The action of the gastric mucosa is *metabolic* rather when it robs the peptone of its deadly power, and the bacterial toxin of its dreaded potency. The toxins in their modified form are still valuable in rousing the protective body cells to produce antitoxins, opsonins and the other antagonistic materials if either cure or immunization is to be accomplished. We accept the facts showing both therapeutic and immunizing value of the virus in many cases when it has been passed through the protective epithelium of the stomach or its counterpart the epidermis of the cutis, but the very need of such a metabolism emphasizes the need of filtration or sterilization in the many cases in which these tissues cannot exercise the requisite metabolic power. The sound cuticle usually bars out the virus of such a deadly infection as anthrax or such a harmless one as cowpox, but if there is the slightest abrasion, pin prick or insect's bite the infection takes effect on the tissues of the susceptible subject. Is it then wise or permissible to introduce by the mouth a toxic, it may be a deadly virus with therapeutic or immunizing intent, when the slightest scratch by alimentary matters, the presence of a sharp or rough foreign body, a wound left by caustic, burning or freezing, an exposure of the *quick* through cryptogamic growth, bacterial invasion or otherwise, the bite of a parasite in the mouth, fauces, pharynx, gullet, stomach or intestine, or the presence of any one of many diseases will open the way for the introduction of the disease germ however deadly or comparatively harmless? So long as we have the opportunity of avoiding these manifold dangers are we not bound by every Hippocratic maxim, by our obligations to humanity, and to humanity's most valuable living possessions, to steer clear of all such uncalled for dangers as we have been portraying and to use in our sanitary work, such agents only as are assuredly sterile, and by channels, that in everyday experience open so many roads to failure, and to loss? Should we deliberately omit such obvious precautions are we to be held guiltless because we have been taught better and licensed to practice medicine and sanitation? Does not our fuller education, broader intelligence and license setting forth the trust that is reposed in



us on account of these, deepen our condemnation when we fail to make use of all known safeguards to protect the citizen and the nation from injudicious and dangerous practices introduced under the name of sanitary work?

*Autotherapy* has been much more availed of in connection with *surgical infections*, therefore in *purulent* and *septic* conditions, and in *slow* or *chronic* cases in which there is time and opportunity for its application. It is, however, applicable to all maladies that are followed by a period of immunity even if that should be in a measure transient. An infection may last in a more or less degenerated tissue where it would die out in normal tissue in healthy condition and with a strong vital activity, always provided the tissue and other lymph cells can elaborate a sufficiency of defensive products. It is mainly the capacity of the cells to perform this work that meets the necessity of the case, although we must never overlook the need for a power of acquired invulnerability toward the toxins, and an ability, with the aid of the opsonins to take in and digest invading bacteria themselves. All available products, and conditions that are inimical to the bacteria and their products should be availed of to hold them in check, while the formation of defensive agents are fostered. Soothing damp applications may be resorted to when there is excessive heat and tenderness. Biel's increase of blood in the part by a cord round the limb, higher up, maintained for an hour or two and then the onward movement of the blood and lymph hastened by the aid of friction, massage, Swedish movement cure, brushing, or even exercise may serve a good purpose in different cases. Anti-septics are rather spurned for fear of decomposing defensive products and rendering them useless. But simple astringents like alum, sugar of lead, tannin, and salicylic acid solution, or salicylate of soda may often be applied to the surface with good effect. Internally nuclein, nucleinic acid, and even colloid metals, glycerophosphates, and even sulphocarbolates may do good.

The common pyogenic bacteria (micrococci, staphylococci, streptococci, colon bacteria, in their wide variations, the septic bacteria and bacilli of the different shades, bacilli like those of tetanus, septicemia, malignant edema, foot rot, streptothrix, actinomycosis, Johne's disease, caseous lymph glands in sheep, goat, calf, guinea pig and rabbit, the tuberculoid disease of rabbits, hares, guinea pigs, rabbits and birds, ulcerous lymphangitis

of horse, ox, and guinea pigs, spirilli, spirochaete, etc.) live largely in soil, where they decompose organic matter and prepare food for plants. In this respect they should be classed with those of blackleg and anthrax, but they differ in their wider extension and the greater difficulty attendant on their extermination. The tendency naturally is to accept them as an irremovable burden or tax that we must continue to bear for all future time and which we can mitigate only when an individual animal is attacked, and by means that come under either treatment or immunization. A certain number of diseases coming from this class of germs have no lasting immunity after a first attack so that we are thrown back on curative treatment alone with such transient immunity as comes from autotherapy and the defensive materials that can be produced by the protective body cells. There is this advantage in dealing with these pyogenic and septic bacteria derived from the soil and surroundings that many of the diseases caused by them come directly from the germs from outside the animal body, and comparatively rarely extend from animal to animal so as to cause a spreading plague. It is therefore the more difficult on the one hand to deal with them through our ordinary measures of plague-prevention, and in a sense relatively more can be accomplished by therapeutics than if they spread rapidly and inevitably from animal to animal. They stand somewhere between the contagious pestilential maladies, and disorders caused by such everyday causes as faulty food, feeding, exposure, overwork, and the like. At any rate, until we can apply effective means for the destruction of their germs in the soil, manure, water and food, we can have no rational hope of their extinction in any given area.

Time forbids any treatment here of such great and important causes of disease as *parasites* which are as truly the cause of communicable and pestilential outbreaks as the bacteridian and protozoan, and are to be dealt with on the same general principles. These have led to great establishments for the production of parasitocides to be given to the suffering animals to destroy the broods of living invaders, already in the body, and ignore altogether the conditions which lead to the survival outside the body and in many cases to the transformations through ova, larva, pupa, and sometimes other forms to fit them for another career within the body of the original host. The fullest knowledge of the life-history of each parasite is just as essential to a rational management of each

parasitism as is a perfect knowledge of each microbe to the successful handling of the disease of which it is the essential and efficient cause.

# ERRATA IN ARTICLE ON RECENT HISTORY OF VETERINARY MEDICINE

by JAMES LAW, (J. A. V. M. A. for July)

- Page 505, 6th line from top for *Regnal* read *Reynal*.  
 Page 505, 7th line from bottom insert *with* between *where* and *the*.  
 Page 505, 3d line from bottom for *lung plagues* read *lung plague*.  
 Page 506, 4th line from top insert comma (,) after *exposure to*.  
 Page 506, 24th line from top for *when* read *was*.  
 Page 506, 26th line from top insert comma (,) after *disease*.  
 Page 507, 17th line from bottom for *he had* read *he had been*.  
 Page 508, 5th line from bottom insert *although* after *so that*.  
 Page 510, 18th line from top insert *but which* after *cattle*.  
 Page 510, 26th line from top insert *that* after *and*.  
 Page 510, 4th line from bottom for *Kirculbright* read *Kirkcudbright*.  
 Page 510, 3d line from bottom insert *the pestilence* after *throughout*.  
 Page 510, on bottom line for *Bote* read *Bute*.  
 Page 511, 15th line from top insert comma (,) after *light*.  
 Page 512, 6th line from bottom insert *and spread* after *escape*.  
 Page 520, on top line insert comma (,) after *things*.  
 Page 520, 21st line from top for *the result* read *this happy result*.  
 Page 520, 12th line from bottom for *be* read *seem*.  
 Page 521, top line, for *causes* read *cases*.  
 Page 521, 4th line from top for *condition* read *conditions*.  
 Page 521, 14th line from top for *arriving at* read *arriving in*.  
 Page 521, 2d line from bottom after *Europe* insert *and*.  
 Page 522, 2d line from top insert comma (,) after *owners*.  
 Page 523, 6th line from top for *infesting* read *infecting*.  
 Page 523, 3d line from bottom for *saccharomysces* read *saccharomyces*.  
 Page 524, 13th line from top insert comma (,) after *from*.  
 Page 524, 7th and 8th lines from bottom for *Gnischer's* read *Meischer's*.

J. A. V. M. A. for *August*

- Page 655, 5th line from bottom for *1912* read *1902*.  
 Page 656, 12th line from top for *evil* read *fatal*.  
 Page 660, 6th line from top put *excellent measure* in *italies* and follow by the word *truly*.  
 Page 661, 10th line from top for *its* read *their*.  
 Page 662, 13th line from top insert comma (,) after *support*.  
 Page 664, 11th line from bottom for *filterable* read *nonfilterable*.  
 Page 665, bottom line insert hyphen (-) between *salt* and *glazed*.  
 Page 666, 11th line from bottom insert *is* before "*not at all impossible*".  
 Page 666, 4th line from bottom insert *subsequent* before "*contamination*".  
 Page 667, on bottom line insert mark of interrogation (?) after "*infamy*".

—Dr. J. H. McNeil, formerly of Brazil and lately at Philadelphia, Pa., has been appointed Chief of the Bureau of Animal Industry, Department of Agriculture at Trenton, N. J. Dr. McNeil began his duties August 1.

## CLINICAL AND CASE REPORTS

"Knowledge is born in laboratories and in the experience of the thoughtful. It develops form in the journals and 'when dead it is decently buried in books'."

### HEMORRHAGIC SEPTICEMIA IN MULES

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Laboratories Penna. State Livestock Sanitary Board,  
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Pasteurellosis or the diseases caused by bipolar bacilli and known by various names as hemorrhagic septicemia, fowl cholera, swine plague, stockyards pneumonia, etc., has been reported from various parts of the United States and foreign countries and because of the losses caused by it each year, is fast becoming of great economic importance. Considerable literature has been written on this disease as it occurs in cattle, swine and some of the other wild and domestic animals though but little can be found regarding the diseases in equines.

Lignieres<sup>1</sup> found an organism belonging to this group in the blood and exudates from cases of equine influenza, and others have since found this organism associated with that disease, but confirmation as to its being the direct cause of influenza is lacking, more recent works indicating that the disease is due to a filterable virus. "The *Bacillus bipolaris septicus* is, however, of etiological importance as the cause of secondary inflammatory processes, especially in the pectoral form of this disease."<sup>2</sup>

Webb<sup>3</sup>, in India in 1907, described an outbreak of hemorrhagic septicemia in mules similar to the one described in this paper. His cases were all in young mules under two years of age which died very suddenly and on necropsy showed lesions of hemorrhagic septicemia. Microscopical examination of blood from the ear revealed bipolar organisms of the hemorrhagic septicemia type uniformly and richly distributed throughout every field examined. In conclusion he writes:—

"As these specimens were not taken until about eight hours after death, and as up to that time I had never met with cases of septicemia hemorrhagica in horses or mules, and could find but scanty literature on the subject relating to the disease in those animals, I was a little doubtful as to whether I was justified in assuming that these organisms were the primary cause of the disease. If they were not, then the only explanation of their presence in such

abundance and in pure culture was that they were present in such numbers in the intestines at the time of death that at the onset of putrefaction they were the first to reach the extremities to the exclusion of organisms of the ordinary putrefactive type."

Two years later Webb<sup>4</sup> also reported outbreaks in horse and donkey young stock due to a bipolar staining bacillus of the fowl cholera type and characterized by an acute and fatal pneumonia.

Gillette<sup>5</sup>, in India in 1912, described a case in a horse which showed symptoms and post-mortem lesions of hemorrhagic septicemia. Smears from the heart blood showed scanty organisms, while those from the intestinal exudate showed them in large numbers and apparently pure.

On August 17th, 1916, we received at the laboratory, organ sections of a mule from one of the agents of the Board\* with information that four of these animals died suddenly twenty-four hours after first symptoms. A microscopical examination of these specimens revealed the following:—Lymph glands hemorrhagic and edematous, lungs congested, pleura petechiated, heart petechiated, spleen slightly enlarged—capsule petechiated, intestines ecchymotic, mucous membranes hemorrhagic.

Smears from the heart blood and organs after staining with methylene-blue revealed large numbers of cocco-bacilli showing characteristic bipolar staining. Cultures were inoculated on plain agar and in bouillon, giving in twenty-four hours a pure growth, characteristic of the hemorrhagic septicemia group of organisms and following which we made a diagnosis of hemorrhagic septicemia.

Laboratory animals were inoculated as follows:—

Guinea pig No. 5353/1, Wt.—280 grams—inoculated August 18th, 1916, 0.01 c.c. twenty-four hour bouillon culture of *B. bipolaris* (mule) intraperitoneally—result negative—died 8/31/16—necropsy—no lesions.

Guinea pig No. 5353/2, Wt.—280 grams, inoculated as No. 1—result negative—discarded 10/12/16.

Rabbit No. 5354/1, Wt.—1980 grams—inoculated as guinea pig No. 5353/1—result negative—died 9/5/16, no lesions.

Rabbit No. 5354/2, Wt.—1840 grams—inoculated as No. 1—result negative—discarded 10/12/16.

\*Dr. Joseph Johnson, Lancaster, Pa.



A visit to the premises provided the following information: Owner had mules on the premises for the last fifteen years without a loss from any trouble which would indicate an infectious or contagious disease.

Case No. 1: On August 10th, 1916, a mule about one year of age appeared to be slightly off feed and at evening of the following day refused all dry food but ate freely of newly cut grass. On the morning of the 12th the animal was found dead.

Case No. 2: On August 12th a year old mule appeared drowsy and showed severe conjunctivitis. On the following morning it became very restless and died after getting up and down for two hours.

Case No. 3: On August 14th, mule one year old showed the same symptoms as the preceding and died the same day.

Case No. 4: On August 15th fourth young mule was taken with the same symptoms and died the following day. This case was autopsied by Dr. Johnson and showed typical lesions of hemorrhagic septicemia. Specimens from this case were the ones forwarded for examination.

Case No. 5: On August 17th the last young mule refused to eat—became drowsy and weak with an unsteady gait that was more pronounced the following day. It died during the night of the 18th. A necropsy was performed and the following notes taken:

Marked icterus, sero-gelatinous infiltration of subcutaneous tissue over abdomen, thorax and more especially in the axillary and inguinal regions. The exudate was yellowish, in some areas local hemorrhages were present. All subcutaneous lymph glands enlarged, edematous, uniformly yellowish discolored, some showing marked hemorrhages.

Upon laying open the thoracic and abdominal cavities the petechiae, ecchymoses and hemorrhages gave the carcass the appearance of having been intentionally spattered with blood.

Thoracic cavity contained a small amount of yellowish fluid. Pleura speckled with hemorrhages of various sizes. Parenchyma of lungs congested, on section dotted with small hemorrhages. Lymph glands swollen and hemorrhagic.

Epicardium and endocardium covered with hemorrhages of various sizes, myocardium soft and organ colored. Heart blood coagulated—currant jelly clot.

The abdominal cavity contained a small amount of yellowish fluid. Peritoneum, mesentery and omentum studded with hemorrhages. Mucous membrane and serous coat of stomach showed numerous petechiae. Intestinal walls thickened and edematous. Both the serous coat and mucous membranes showed numerous hemorrhages varying in size from that of a mustard seed to a half dollar. This condition was noted throughout the entire intestinal tract. Mesenteric lymph glands greatly enlarged, soft and hemorrhagic.

Liver congested, soft and friable. Kidneys congested, very friable, capsule slightly petechiated and peeled readily.

Specimens from various organs, heart blood and exudates were collected and brought back for examination.

In questioning the owner with reference to the handling of these animals during the summer months we were informed that they had not been on pasture at all and that the feed consisted of hay cut from high ground during July of the same year and fed soon after cutting. Upon examination it was found to be free from moulds but badly stained from exposure to rain. The corn fed was old and had been a part of the ration for the past eight months. Western oats had been fed since the last of May. There had been no radical change in the method of feeding and the feed itself appeared to be in good condition. The water supply was excellent, coming from artesian wells. Remaining animals in the stable, including three horses over twelve years old and one mule five years old, appeared perfectly normal.

On returning to the laboratory, smears of the heart blood and exudates were examined after staining with methylene blue. In both cases large numbers of typical bipolar staining organisms slightly larger than the fowl cholera type, were uniformly distributed. Agar and bouillon tubes were inoculated from all specimens and in every instance pure cultures of this bipolar organism were obtained.

Animal inoculations were made from cultures obtained from the heart blood using larger doses than in the case of strains isolated from case No. 4.

Rabbit No. 5359/1, Wt. 1370 grams—inoculated August 23rd, 1916, 0.3 c.c. twenty-four hour bouillon culture of *B. bipolaris* (Mule No. 5) intravenously—results negative—discarded 10/12/16.

Rabbit No. 5359/2, Wt. 1590 grams—inoculated 0.3 c.c. subcutaneously—results negative—discarded 10/12/16.

Guinea pig 5360/1, Wt. 380 grams—inoculated 0.2 c.c. intraperitoneally—result negative—discarded 10/12/16.

Guinea pig No. 5360/2, Wt. 420 grams—inoculated 0.2 c.c. subcutaneously—result negative—died 9/15/16—no lesions.

Having been recently isolated from a virulent outbreak, it was rather surprising to find these strains avirulent for rabbits and guinea pigs. On the other hand it corroborates the experience of the junior writer while working with strains of bipolar organisms isolated from a virulent outbreak of influenza\*. In this instance recently isolated cultures failed to kill laboratory animals and rendered difficult the identification of the strains, as at that time there was no opportunity to examine these organisms in tissue fluid, they having been obtained from tracheal swabs.

We have had difficulty in keeping the cultures, isolated from these mules, growing on artificial media. Like other members of the group it was thought that transplantation once a month would suffice to insure against their loss, but this did not prove to be the case as fresh young cultures would die out suddenly without apparent cause. Other laboratories experienced the same difficulty with strains supplied them.

In an effort to determine the source of infection, feed and water samples were collected and cultural and animal inoculation tests were made, but with negative results. This, however, does not eliminate these factors as possible sources of infection, inasmuch as pure cultures of isolated strains, before stated, proved avirulent for experimental animals.

In conclusion we may state that an outbreak of hemorrhagic septicemia occurred in young mules in Pennsylvania, the diagnosis being based on the fact that the two cases autopsied showed characteristic lesions of hemorrhagic septicemia, as seen in the acute form of this disease in cattle, without the presence of pneumonia or any other condition to indicate that the lesions were of a secondary nature, furthermore in both cases the heart blood and tissue fluids were found teeming with typical bipolar organisms, cultures of which were readily isolated, and showed the growth characteristic of this group.

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\*Equine Influenza—Reichel, Harkins, Munce and Boerner. Read before Penna. State Vet. Med. Ass'n, March, 1916.

## LITERATURE

1. *Bulletin de La Societe Centr. de Medicine Veterinaire*, 1897, p. 335.
2. Hutyra & Marek, Vol. 1, p. 193.
3. *Journal of Comp. Path. and Therapeutics*, Vol. XX, Part 2, 1907.
4. *Ibid*, 1909, Vol. XXII, p. 105.
5. *Ibid*, 1912, Vol. XXV, p. 321.

## BOVINE HEMATURIA

SEYMOUR HADWEN, D.V.Sc.

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*Definition.* This disease which appears most frequently at the end of winter is characterized by the emission of blood in the urine of vesical origin.

*Symptoms.* The temperature in the primary stages of the disease is normal and the animals show no outward sign of being affected except that they urinate more frequently than normally, and pass blood at the end of the act of micturition. In the later stages of the disease the animals develop a depraved appetite, become emaciated and anemic owing to repeated blood losses, edemas and diarrhoea supervene, and the animals eventually die of cachexia. The duration of the disease is extremely variable. Through anatomical consideration it is shorter in males than in females owing to the sigmoid flexure in the male's penis. Females are able to pass much larger clots, hence the urethra is less liable to become obstructed. Owing to the fact that in the primary stages of the disease the earlier symptoms may be overlooked, it is a matter of extreme difficulty to state the actual duration of the disease; but as a rule animals do not die under a year after they have first manifested symptoms; though some few cases with a hemophiliae tendency die more rapidly. On the other hand many animals live for years in apparent good health except for the emission of bloody urine. In the late stages of the disease a number of complications may arise; the commonest termination being the invasion of the bladder and kidneys by pyogenic cocci, resulting in a cystitis and pyelonephritis. Other symptoms to be noted are blood clots hanging to the tail, the vulval hairs being blood stained and in some cases there is strangury. The eyes become sunken and the mucous membranes blanched. Diarrhoea is common in the final stages of the disease. There are some few cases in which the disease has run an apparently benign course without

exhibiting marked symptoms, which have terminated fatally and quite suddenly from hemorrhage the carcass being practically bloodless. The average age at which animals become affected is six years. The youngest at about two years, and the oldest at from twelve to fourteen years. This disease is associated with poor farm lands; woodland, newly cleared farms, or farms that are either neglected or are falling out of cultivation; hence it has been called a poor man's disease.

*Lesions.* In nearly all the writings mention is made of the initial pin-point hemorrhages; this appearance, however, can be seen in normal contracted bladders, and consists of small varicosities and tufts of blood vessels which are presumably necessary owing to the great amount of distention which the bladder must undergo. However, the initial lesions partake somewhat of this character. The mucous membranes vary markedly in the different cases. Sometimes they are in rough raised red ridges, in others they appear normal except for eroded patches which are bleeding, and submucous hemorrhages; these are the usual forms of early cases. In the older ones there is fibrous thickening, a tendency to proliferation and the formation of papillomata. The walls of the bladder may have become considerably thickened and the organ loses all power of dilating; in such a case there is almost a constant dribbling of urine containing as a rule but little blood. This is the most chronic form of the disease. In other cases the organs become permanently dilated through the occlusion of the urethra by clots. This is the most chronic form of the disease. Occasionally large vegetations of a peduncular character occur in a bladder that otherwise appears fairly normal. Moussu remarks that the lesions found in the bladder are in various stages, and this has also been noted in the British Columbia form of the disease. Rarely cicatrices are encountered, proving that as a rule there is no tendency for the lesions to heal, which goes a long way to explain the chronicity of the malady. As a general rule the lesions are most marked at its inferior part; in rare cases are the ureters affected, in which event one or other of the kidneys may become cystic. The lesions appear most active towards the end of the stabling period, namely about the month of February. Thirty-nine post mortem examinations have been made during the investigation, and a number of bladders have been examined at the laboratory from other sources. This in brief describes the usual



lesions. The other organs in the body generally appear healthy though occasionally the condition of the liver is not normal, and in two or three cases there have been complications in the shape of cancer. In the early cases all the organs appear normal, with the exception of the bladder.

*Urine.* The amount passed in the twenty-four hours of course depends in a measure on the size of the animal. In an experiment which was conducted for a twenty-four hour period two redwater cows passed a litre per hundredweight and two normal cows passed a like amount. The redwater cows urinated one ten times and the other nine times and the normal cows both passed their urine six times during this period. In one case the amount of blood lost in the twenty-four hours was 1101 c.c. of actual blood, the other 738 c.c. Experiments carried out by H. L. Keegan at Guelph go to prove that the amount of urine voided by cows in a normal state of health is approximately equal to that passed by redwater animals, viz., one litre for every hundred pounds live weight. The blood loss mentioned is of course a very heavy one and a day or two later might have dropped to a fraction of that amount. There are ups and downs in the quantity passed during the day, largely dependent on the amount of exercise and straining. Clots in the urine are common in the late stages when blood is present in larger quantities, earlier the salts in the urine are in sufficient quantity to prevent coagulation. On sedimentation as a rule the red cells have a normal appearance. The supernatant liquid is generally of a clear amber color. Pigmentations occasionally occur, especially in the urines which are contaminated with bacteria. There is, however, a pigmentation seen which might be mistaken for blood; this appears to be in the nature of a hemoglobinuria which has been noticed in late cases, and also in apparently normal animals. According to Miller post hemorrhagic hemoglobinuria occurs after great blood loss; the loss of blood engenders a hemolysin inducing a hemoglobinemic autolysis with hemoglobinuria. The reaction of the urine is generally strongly alkaline, but in a few instances the reaction had become neutral owing to the excessive amounts of blood contained in it. At first the urine is practically sterile but after a time when blood is constantly present in the bladder it becomes contaminated, streptococci are often found and these have also been encountered in the kidneys when infection had spread up the ureters. The calcium

oxalate crystals which are believed to play such an important part in giving rise to the lesions are more plentiful in the early stages of the disease. According to Roger the number of calcium oxalate crystals are not always a true indication of the amount of oxalates in the urine. When there is much blood present in the urine the crystals are often difficult to find. Gordon states that union takes place between the oxalates and albuminous substances. The crystals assume many shapes, the commonest being the envelope form and are often present in large numbers. Other crystalline forms are not mentioned as they do not appear to play an important part in the production of this disease. On post mortem the kidneys usually look healthy, except for the occasional presence of calculi. A number of these calculi were sent to the Dominion Chemist for analysis who reported that they did not contain oxalates. Injection of dilute solution of oxalic acid into the bladder caused the production of large numbers of crystals of calcium oxalate and if these injections are continued a condition of the bladder is produced clinically indistinguishable from an ordinary case of hematuria.

*Blood.* In the early stages the blood appears normal. The first sign is a variation in the size of the red cells; this is followed by the usual changes seen in secondary anemia. There is no variation in the percentages of the various leucocytes, except in the cases of pus infection, which have been mentioned before, in which event there is an increase in the number of the polymorphonuclears. The blood picture changes from month to month as the disease advances or recedes. The clotting property of the blood is generally low but shortly before death an increase has been noted, and large obliterating clots are formed occluding the urethra.

*The experimental drenching of cattle with oxalic acid.* Some of this work was included in the report of the Veterinary Director General for 1914. As will be observed by reading this report the first experiments on drenching showed that oxalic acid was very toxic, but that later on the animals become accustomed to it. One animal four months old was killed by overdosing in sixteen days, 1170 grams of oxalic acid having been given. A two-months-old calf received 101 doses from January 2nd to June 28th, 2365 grams, the animal died on the later date. These large doses produced the usual symptoms due to oxalic acid poisoning which were given in

the report mentioned. Albumin and red cells were noted in the urine together with numerous oxalate crystals. After the death of these animals a dose was arrived at which could be borne with safety and in all subsequent experiments made, 30 grams were given per day, the animals having an occasional rest. Three animals were dosed for the periods set down, one of them, *Cow 4*, received 395 doses (11850 grams) from June 30th, 1914, to July 5th, 1916. She was killed on October 23rd, 1916. Her bladder was rough and thick, all the other organs looked normal and she was in excellent condition when killed. *Cow 5*, from May, 1914, to March 14th, 1917, this cow was given 5771 doses equalling 17310 grams of oxalic acid. She kept fat and well until the autumn of 1916. In November despite care and extra food this animal began to go down hill and in the later part of December and January began to pass red urine until she finally got down and became so weak that she was killed on March 29th, 1917.

*Post Mortem Notes.* Carcass, thin and dropsical. Excess of fluid in abdomen. All organs appeared normal except one kidney and the bladder; this kidney was slightly cystic, a few small brown calculi were found in the kidneys. The bladder had the typical appearance of a case of hematuria. There were many flocculent masses of crystals floating in red urine, the mucous membranes showed numerous petechial spots and vegetations. The blood was anemic clotting feebly. There were many oxalates in the urine.

*Steer.* The experiment began November 26th, 1913, the animal being two months old. Up to March 31st, 1917, this animal has received 697 doses of oxalic acid equalling 20910 grams. At this date of writing the animal is still plump with a good coat; he is not nearly as large as he should be and is small boned and stunted, though he came of large stock. The casual observer would never suspect that he had received such a large amount of a toxic drug. When the experiment was first started 8 gram doses were given, this amount was increased up to 60 grams a day but as toxic symptoms appeared the dose was reduced. Afterwards a uniform dose was given to all the animals, i. e., 30 grams per day, which was usually for six days in the week.

*Summary of experiments.* The long period that elapses before the appearance of symptoms (six years on the average in natural cases) makes experimentation a slow process. The first two animals were killed by excessive dosing. One animal was

killed too early in the experiments, another still survives and the fifth developed the disease and went through all the symptoms of a natural case. On post mortem the lesions were unmistakably of hematuria. The steer's case is most remarkable as it shows how much oxalic acid can be borne without any marked ill effects. It is true that he has passed albumin and abnormal amounts of crystals which will in time cause serious trouble, but we have noticed that young animals resist better than the old, either from the administration of oxalic acid by the mouth or by injection into the bladder. This is further borne out by the occurrence of the disease in nature. Doubtless the feeding of oxalic acid bearing plants would be the best way of reproducing the disease, but owing to the difficulty of getting these in sufficient quantity commercial oxalic acid was used.

*The experimental injection of calcium oxalate crystals into the bladder.* These experiments were described in the report of the Veterinary Director General for 1914. Three animals were used and they all exhibited similar symptoms, i. e., straining, and after repeated injections voided blood. One animal died too early in the experiments for any lesions to have developed, the other two on post mortem showed marked thickening of the walls of the bladder. These experiments were not kept on as long as the drenching experiments, partly owing to the difficulty experienced in making typical calcium crystals and it cannot be said that they developed typical lesions of hematuria. The work, however, established the fact that the crystals were capable of wounding the bladder and causing hemorrhage. In one of the cases (Heifer 3.) it was interesting to note that at times she passed urine which coagulated on standing; this was not always at the times when there were the largest number of red cells in it, evidently the crystals were wounding the bladder walls sufficiently to allow the escape of serum but not of red cells. In natural cases an identical condition has been seen, especially in the later stages when there appears to be an exudation of serum rather than of blood from the bladder.

*Experimental injections of dilute solutions of oxalic acid into the bladder.*

*Experiment 1. Heifer, six weeks old. July 13th, 1914.* Was given an injection into the bladder of 5 grams of oxalic acid in water. From July 13th to February 5th, 1915 she was given 21 doses, equaling about 100 grams of oxalic acid, or 5 grams to the

dose. No injections were made after February 5th as the heifer plainly showed that she was going down hill fast and was passing red urine. April 8th. A large clot several inches long was seen hanging from the vulva.

Blood drawn from the general circulation coagulated in 33 minutes. April 30th. The heifer was passing large clots like a bad case of hematuria. May 1st. Straining and passing clots. May 6th. Heifer moribund, killed.

*Post Mortem Notes.* Carcass greatly emaciated, edema under jaws. Excess of fluid in the pericardial sac, also in the abdomen. Kidneys large, pyelonephritis, ureters enlarged. Bladder dilated, the lesions found were those of a natural case of hematuria.

*Experiment 2. Aged cow.* From June 7th, 1915 to November 20th, 1916; twelve injections of five grams of oxalic acid were given in water. From March 24th, 1916 to October 3rd, 1916 no doses were given, it being thought that the animal might break down at any time, for this reason they were started again on October 3rd, resulting in symptoms being presented in December; the animal passed blood during December, January and February and on February 23rd was killed as she had been down for several days.

*Post Mortem Notes.* The kidneys showed pus infection, streptococci and there were some calculi present. The bladder had eroded patches and were bleeding as in a natural case. Oxalates were present in the urine.

*Experiment 3.* A young heifer. This animal received the same number of injections as in Experiment 2. So far she has not developed the disease though after each injection there have been the usual signs of straining and blood has been recorded several times in the urine. Experiment not concluded.

*Summary.* Injections of dilute oxalic acid solutions provoke great irritation and subsequently the urine is stained with blood. Calcium oxalate crystals are formed in the bladder as soon as the acid comes in contact with the urine and mucus. After a time the urine becomes contaminated with bacteria which no doubt play a part in aggravating and maintaining the lesions. It is probable that the acid has a direct effect on the walls of the bladder as well as the crystals. Two out of the three cases developed a disease indistinguishable from natural cases of hematuria.

*Controls.* A number of animals have served as controls to the experiments. On an average 65 head of cattle have been kept on



this farm during the course of the experiments, and not a single case of hematuria has developed among them.

*Conclusions.* The oxalic acid theory which was advanced in the report of the Veterinary Director General for 1914, has been backed by the foregoing experiments. There is one important omission in this report concerning the bacteria which contaminate the bladder after the disease has progressed for a time. In the previous reports due emphasis had been made of their probable significance in maintaining the lesions in a state of activity. Galtier had the same idea but attributed distomatosis as the predisposing cause of the disease which, as Moussu points out, is entirely wrong. Galtier, however, thought that irritant plants had something to do with the affection. With oxalic acid to wound the walls of the bladder, either through the cutting action of calcium oxalate crystals or through the effect of the acid followed by bacteria to keep the lesions active, seems entirely to fit the case. Moussu in a review of the work done at Agassiz says: "This idea is certainly original, and agrees fairly well with that put forward before by Pichon and Sinoir on the rôle of certain special plants and nothing authorizes one *a priori* to say that it is not well founded or exact". The only objection Moussu raises is that if hematuria were only the consequence of animals eating irritant plants, then that in the majority of cases they should recover when removed to healthy regions. He says, however, that this might be objected to on the grounds that the lesions once firmly established cannot be cured. This, no doubt, is the correct interpretation, and in British Columbia such cases have occurred; as Professor Moussu remarks, a cure may occasionally take place, but it is not the rule and in all the experimental animals upon which constant observations have been made (numbering 66) not a single case has lived over 5 years after showing the initial symptoms. There are cases on record where animals have lived for longer periods but there are no such authentic records for British Columbia. Remissions have occurred during which periods the animal seemed in perfect health, but they always broke down again and have never lasted for much more than a year. Moussu states as follows: "In all countries bovine hematuria is a disease of certain poor regions of which the soil and flora present special characters. The idea of the influence of soil, the flora and the action of certain plants, have been sustained everywhere. The fact that cultural transformations in modi-

fyng the flora may bring about the disappearance of hematuria in the affected regions, can be interpreted in favor of the idea emitted by the author". It is not necessary to go into great detail over this matter as it was fully explained in the 1914 report, it is sufficient to state, that in British Columbia the disease is confined almost entirely to the bench lands bordering on the Pacific. Clelland has noted the same thing in Australia and Case in Hawaii. In view of the foregoing facts it cannot be expected that veterinary surgeons can hope to successfully treat this malady, or at any rate do more than prolong life and perhaps turn an animal into beef which otherwise would have died naturally. With this end in view the first thing to do is to tie the animal up and to keep it as quiet as possible. This useful precaution appears to have been overlooked in the articles dealing with treatment, as exercise invariably augments the percentage of blood in the urine. Lime salts, iron and tonics have proved beneficial, together with occasional doses of magnesium sulphate. The chief object should be a prophylactic one consisting in the application of lime to the land and in keeping the animals away from rough uncleared areas. Watering the animals' hay with lime water has been recommended to a number of farmers and some of them report favorably on its use, but the usual difficulty has been experienced in getting farmers to do this regularly. The disappearance of the disease from certain farms and districts following agricultural improvement has been observed both in this country and in France which is another corroborating point in favor of the theory. It is to be hoped that other experimenters will undertake researches. Apparently very little work in Europe is being done now on this important disease of cattle. In a recent article Roger remarks, that oxalemia should have a place in veterinary pathology and believes that it plays an important part in the diseases of horses; why not then for cattle?

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## FORMALIN TREATMENT IN MASTITIS

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J. K. BOSSHART, Camden, N. Y.

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Good results have been obtained in mastitis in cattle from the use of formalin and turpentine as advised by J. N. Frost. Half ounce doses, however, have been found too toxic for some individuals. Such a dose in one pint of raw linseed oil was given to one large cow. Intense coughing and superficial respirations with a collapsible shaking motion of the abdominal muscles after each respiration followed immediately. Anorexia persisted with these symptoms and polyuria for five days. By the application of a suspensory bandage with a wet pack the local symptoms were ameliorated. Recovery finally was complete.

Similar observations have been made in another case. One teaspoonful or about one-fifth of an ounce in one-half pint of raw linseed oil twice to three times daily alternated with one ounce of turpentine in oil seems to be a safer dosage. If no untoward results occur the doses may then be increased with the amount of oil. Laxative results do not seem to be more than from grass.

A suspensory bandage with frequent milking of the affected quarters seems to be a large factor to hasten recovery. Wet pads in warm weather and packs of some bland oil for the night and in cold weather, kept in place by the suspensory bandage, seem to be very beneficial.

Abscess formation has followed in some cases, which was surgically treated where possible. In other cases the abscesses broke open after a while and recovery took place in due time.

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—Dr. G. P. Mayer, formerly of Elk Rapids, Mich., has purchased the interest of Dr. Bowman in the veterinary practice of Bowman & Davidson of Tecumseh, Neb. Dr. and Mrs. Mayer made the trip to their new location by automobile.

—Dr. J. H. Woodside of Groton, N. Y., has gone into veterinary practice at Redmond, Wash.

—Dr. C. A. Raque has removed from Spokane, Wash. to Fresno, Calif.

—Dr. Gilbert S. Weaver has removed from Mitchell to Brookings, S. D.

## ABSTRACTS FROM RECENT LITERATURE

VESICAL CALCULUS IN A MARE. Dr. Arturo Galli. *Il Nuovo Ercolani*.—A sixteen-year-old mare had difficulty in micturition. She presented all the symptoms of trouble with the bladder. Cystitis perhaps, due to the presence of a calculus. Indeed one was readily detected by rectal examination, in the shape of a round body as big as a large almond, moving somewhat freely in the bladder. A metallic catheter introduced in the bladder and rubbing against the stone gave the peculiar noise and characteristic sensation. On account of the size of the stone its extraction was not possible in its entirety. It was decided to crush it. A lithothriptor of Civiale was procured. The instrument was introduced into the bladder and carefully brought in contact with the stone; this was, so to speak, immobilized with the left hand in the rectum and then secured between the jaws of the instrument, when it was readily crushed. The instrument was removed without having caused any injury to the mucous membrane of the bladder, an accident not uncommonly met with.

For a few days after the operation the mare passed urine slightly tinted red, micturition being slightly painful but being also accompanied with pieces of calculus. After eight days no more trouble was observed and rectal examination showed the bladder free of all stone. Recovery was perfect.

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PHARMACOLOGIC STUDIES WITH COCAIN AND NOVOCAIN. George B. Roth. (From the Hygienic Lab., U. S. Public Health Service.) Copied from the *Jour. of Pharmacology and Exp. Therapeutics*, Vol. IX, March, 1917, No. 6, p. 352.—The relative toxicity of cocaine and novocain, as shown by animal experiments, varies, the variation being dependent mainly upon the animal employed as test animal. The relative toxicity of cocaine and novocain for various animals, when given subcutaneously, is as follows: For frogs (*Rana pipiens*) the ratio is 1.0 to 1.4; mice 5.5 to 1; rats 10 to 1; guinea pigs 10 to 1; and rabbits 5.3 to 1. When given intravenously to rabbits, the ratio of toxicity of cocaine to novocain is 3.9 to 1. When administered intravenously the rate of injection is a factor in modifying the toxicity. The subcutaneous administration of large sublethal doses of novocain in the dog and cat causes marked general symptoms which rapidly subside. The ratio of

the toxicity of cocain and novocain for mice, when fed on cakes containing these substances, is much wider than when given in any other way, cocain being about fifty times as toxic as novocain.

The effects of novocain on the isolated heart of the frog resemble the effects produced by cocain as a rule, both substances causing in *Rana pipiens* a decrease in heart rate and in the extent of systole. The relative toxicity on the heart of the frog is determined by perfusion experiments, is less for novocain than for cocain. On smooth muscle, the effect of novocain differs slightly from that produced by cocain. On the isolated ureter of the dog, the isolated urinary bladder and stomach of the cat, the isolated uterus of the rabbit, the effect of novocain differs from that of cocain only in being stimulating to a less degree when similar dilutions are used. On the isolated intestine of the rabbit, cocain stimulates in dilute solutions, and in concentrated solutions depresses intestinal motility; whereas novocain depresses it in any effective concentration. Both cocain and novocain increase blood pressure and respiration in rabbits with small doses, and depress with large doses. When given subdurally, the relative toxicity of cocain and novocain is practically the same, as shown by the comparative effects of large doses on the blood pressure and respiration. Death in rabbits after cocain or novocain poisoning is usually respiratory, but with novocain under certain conditions, death may be cardiac.

REICHEL.

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CLINICAL OBSERVATIONS. Major Veterinarians Robert and Thevenot. *Bullet. de la Soc. Cent.*—These are the records of a number of cases where the polyvalent serum of Leclainche and Vallée was used.

1—*Cyst* of the wings of the nostrils, which, in a mare, closed entirely the false nostril and interfered with the respiration. Incision, curettage, injection of serum. Cicatrization without supuration in a week.

2—*Pistulous Withers* in which the spinous processes of the dorsal vertebrae were necrosed. Excision, tepid physiological serum washing, polyvalent application, rapid cicatrization. 3—*Cutaneous Quittor and Cracked Heels* simple serum treatment. 4—*Cartilaginous Quittor* operated by classical methol, dressing with serum. 5—*Open Comminuted Fracture* of lower jaw with large loose splinter of necrosed bone: cleaning of the wound, polyva-



lent serum dressing, recovery after the formation of small abscesses. 6—*Inguinal Cryptorchidism*. Same dressing as above after the operation. 7—*Wound of Castration*. The serum was used after castration by limited torsion or simple incision. The stump of the cord was washed with physiological serum first and the polyvalent injected in the wound afterward. Similar treatment had been used in several other cases of castration. In all the cicatrization was very rapid and permitted the horses to resume work in short time.

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ORNSTEIN, G. *Jour. Industrial and Engineering Chemistry*, Vol. 9, p. 817, 1917.—Dr. Alexis Carrel, in conjunction with Dr. H. D. Dakin, has evolved a comparatively new and revolutionary method for treating infected wounds, using a definite hypochlorite solution. A new method for the preparation of this so-called Dakin solution was worked out by G. Ornstein for the Electro-Bleaching Gas Co. The method consists in enclosing liquid chlorine in quantities of exactly 5 grams in glass tubes sealed at one end, the other end being drawn to a point. The method of breaking the ampoule with liquid chlorine in the alkali solution has been recently improved by a simple device. The glass bottle in which the solution is prepared is now closed by a rubber stopper, to the bottom of which is fastened a short piece of rubber tubing by means of a short piece of glass rod. The ampoule is fastened with its butt in the open end of the rubber tubing so that the pointed end points downward, and the ampoule is suspended pendulum-like containing the alkali solution. The Electro-Bleaching Gas Co. has recently completed arrangements with the pharmaceutical firm of Johnson and Johnson, New Brunswick, N. J., for the marketing of this new liquid chlorine product.

(See page 109, *Journal of A. V. M. A.*, 1916, for further information on Dakin's Solution).

BERG.

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SEVERE TRAUMA OF THE NECK. Major Veterinarian Chouleur. *Bull. de la Soc. Cent.*—An eight year old sorrel mare, through an automobile accident, had the neck run through by a broken shaft. The neck seemed completely tetanized. On both sides there was a vertical wound; on one side it was at the base of the neck, a short distance from the anterior border of the scapula, on the other it was between the middle and the inferior third. These bruised

lacerated wounds were communicating by a channel between the muscles above the vertical axis. Torn tissues and a piece of wood were extracted. Boiled saline water was used first to clean the parts and then polyvalent serum was freely injected. This mode of treatment was followed with improvement, manifesting itself in a few days by a reduction in the swelling of the region, diminution and arrest of the suppuration, complete cicatrization in less than a month. Such a result could hardly be looked for, considering the extent of the wound, the complicated anatomy injured, the nature of the puncturing foreign body and the constant exposure of the wound, which could not be thoroughly protected from outside influences.

THE TOXICITY OF SALVARSAN AND NEOSALVARSAN. Louise Pearce and Wade H. Brown. (From the Laboratories of the Rockefeller Inst. for Medical Research). Copied from the *Jour. of Pharmacology and Exp. Therapeutics*, Vol. IX, March, 1917, No. 6, p. 354.—During the course of the work in chemotherapy, which is being carried on at the Rockefeller Institute, a series of experiments on the toxicity of salvarsan and neosalvarsan was undertaken. Mice, rats, guinea pigs and rabbits were used. Solutions of these drugs were injected subcutaneously, intravenously, and intraperitoneally in mice; subcutaneously and intraperitoneally in rats and guinea pigs; and intravenously in rabbits. Care was taken to inject the solutions as rapidly as possible, especially with solutions of neosalvarsan, the toxicity of which is known to increase very markedly on exposure to the air for as short a time as fifteen minutes (Ehrlich).

The toxicity of both substances was found to be quite irregular. The M. L. D. (Minimum lethal dose) as expressed in milligrams per 20 grams of body weight are as follows:

SALVARSAN			
	S. C.	I. P.	I. V.
Mice	2.5	3.25-3.5	2.5-3.0
Rats	3.5-4.0	2.25-2.5	
Guinea Pigs	1.5-2.0	1.0-1.5	
Rabbits			2.25
NEOSALVARSAN			
Mice	2.0-2.5	1.5-2.0	3.5-4.5
Rats	1.5-2.0	1.0-1.5	
Guinea Pigs	1.5-2.0	1.5-2.0	
Rabbits			3.0-4.0

S. C.—subcutaneous. I. P.—intraperitoneal. I. V.—intravenous.

The M. L. D. was chosen as a standard for the toxicity of the drugs as being a more definite and clear cut value than the relatively indefinite D. T. (*dosis tolerata*). The M. L. D. includes all deaths of animals that can be attributed to the action of the drugs, whether an acute action within twenty-four to forty-eight hours or at a later time due to pathological lesions characteristic of the drug.

Following the administration of even smaller doses than the M. L. D. of both salvarsan and neosalvarsan, there may be a distinct impairment of the animal's metabolic functions as indicated by the loss in body weight and which may not be accompanied by gross or microscopic changes in the organs.

Of the two drugs, it is our opinion that neosalvarsan shows greater irregularities in toxicity than salvarsan, and produces much more marked pathological alterations and impairment of vitality in experimental animals.

REICHEL.

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PARALYSIS OF THE ANTERIOR CRURAL AND OF THE RADIAL NERVES. W. Wynn Lloyd, M.R.C.V.S. *Veterinary News*. Aged half bred mare bolted and fell on the off side. She was assisted to get up and, supported on either side, was taken to her stable. It was with great difficulty that she could be made to walk a few yards, the owner being obliged to extend her off fore leg while progressing and at the same time the off hind leg was entirely unable to bear the slightest weight. All the joints were more or less flexed. The only apparent outward and visible symptoms were a little swelling and bruising of the shoulder and thigh. Rectal examination revealed no fracture. A diagnosis of double paralysis was made, that of the crural nerve being incomplete as there was some sensation on the inside of the thigh. The mare was placed in slings. Fomentations were carried on for a few days and later counter irritation. After four weeks, the slings were taken off and the mare allowed some exercise. On account of the atrophy of the muscles of the shoulder and quarters the animal moved at first with difficulty but after massage and increasing exercise the locomotion soon returned to its normal condition.

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A COMPARATIVE STUDY OF BACTERIUM PULLORUM (RETTGER) AND BACTERIUM SANGUINARIUM (MOORE). Leo F. Rettger and Stewart A. Koser. (From the Sheffield Laboratory of Bacteriology

and Hygiene, Yale University, and from the Storrs Agricultural Exp. Station.) *Jour. of Med. Research*, Vol. XXXV, No. 3, Jan. 1917, p. 443.

**SUMMARY.** Despite the several characters which the two organisms have in common, and particularly the serological reactions, *Bacterium pullorum* and *Bacterium sanguinarium* constitute two separate and distinct types, and each bears a specific relationship to the disease with which it has been associated in the past, namely, bacillary white diarrhea or fowl typhoid.

*B. pullorum* differs from *B. sanguinarium* in several important respects, aside from morphology. Dextrin, maltose, and dulcitol are attacked by the latter, with the production of acid but no gas. *B. pullorum*, on the other hand, produces no visible change in media containing these agents except slight alkali production. *B. pullorum* acts upon dextrose and mannitol with the evolution of appreciable amounts of gas, while the fowl typhoid bacillus, whether recently isolated or artificially cultivated for many years, does not produce gas in any of the carbohydrate media. Furthermore, prolonged cultivation of *B. pullorum* in the laboratory does not cause this organism to lose its power of producing gas in dextrose and mannitol broth.

The methyl-red test applied to cultures grown in one per cent maltose-bouillon was found to furnish a practical method of distinguishing between the two types of bacteria, *B. sanguinarium* being methyl-red positive and *B. pullorum* negative.

While both organisms are pathogenic to fowls of all ages in experimental inoculation, *B. pullorum* manifests itself only as the cause of natural epidemic infection in young chicks. On the other hand, *B. sanguinarium* attacks fowls of different ages, although it is of relatively little, if indeed any, significance as the cause of epidemic disease in very young chicks.

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SARCOSPORIDIOSIS IN CATTLE. E. E. Franco and I. Borges. *Arquivos do Instit. Bact. Camara Pestana* (Lisbon), Vol. 4, p. 269, 1916. Abst. in *The Review of Bacteriology*, etc., Vol. VII, Part 1, 1917, p. 10.

For many years the meat inspectors of the Municipal Abattoir at Lisbon have noted, especially among cattle coming from the province of Alentejo, a number of carcasses which presented generalised nodular lesions on the aponeurosis of muscles and in the subcutaneous tissue. The frequency of occurrence of these cases varies from time to time, the largest number of cases occurred in 1913, when the number of carcasses condemned for this cause represented 5.6 per 10,000 of all animals killed in the abattoir. The nodules, which are of a light yellowish colour, measure from .25 mm. to 4 mm. in diameter. They may appear either as single discrete nodules, or may be massed together to form small subcutaneous tumors of about the size of a lentil. They occur only in the superficial muscle aponeuroses and in the subcutaneous tissue of the head, trunk and limbs. The parasite appears to be identical with *Sarcocystis besnoiti* of Besnoit and Robin. The general health of infected cattle does not appear to be affected materially. The cysts present two walls, an external structureless membrane and a cellular internal membrane which consists of a finely reticulated protoplasm in which a number of large spherical nuclei are to be seen. The inner surface of the internal membrane has the appearance of an endothelium. The cysts contain closely packed, slightly curved sporozoites. The sporozoites measure from 4.5  $\mu$  to 6.5  $\mu$  in length, and from 1  $\mu$  to 1.8  $\mu$  in breadth. Their extremities are rounded, one being always larger than the other. The nucleus is usually situated near the larger end. The protoplasm is finely granular, and presents one or more brightly refractile granules.



The sporozoites at the periphery of the cyst appeared to be implanted at their outer end in the lining membrane. From the inner end of the attached sporozoite a series of sporozoites radiate in an undulating line towards the center of the cyst. Two forms of imperfect, or degenerating, cysts are seen occasionally. In some the external capsule or membrane appears to be wrinkled, the internal membrane is not apparent, and instead of sporozoites the cyst contains round tissue cells and eosinophile cells. Other cysts contain a homogeneous substance, in which remains of the nuclei of the sporozoites can be seen here and there. The tissues surrounding the cyst present a zone of cellular infiltration, in which connective tissue cells, plasma cells, plasmocytes and pericyto-chromoplasmatic cells can be seen.

REICHEL.

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INTERESTING FRACTURE OF THE OS CORONAE. Capt. J. F. Tutt, A.V.C. *Veterinary Record*. This horse had been previously lame after jumping and had been laid up for four weeks. Put to work again for one day, he again went lame and was a second time laid up for a week. He afterwards was sent to his work with an officer and kept at it for several months and again became lame. Laid up for a few days and having recovered he went again to work and finally one day while out exercising, he shied, jumped sideways and fell on a grassy bank. When he got up he was dead lame in the near fore leg. The condition of the animal was such that he was destroyed after a few days. At the post mortem the os coronae was found fractured in eight pieces which were firmly held together by a mass of formed connective tissue.

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ANOMALY OF A VALVE IN THE HEART OF A HORSE. T. G. Brown, M.R.C.V.S. *Veterinary Record*. This was found in a horse used for dissection purposes. The pulmonary semi-lunar valve consisted of only two cusps, which were about equal in size. They were larger than normal, but of the usual shape. One was right anterior and the other left posterior. There was no interval between them nor was there any indication whatever of the presence of a third and the valve appeared quite competent. The heart was otherwise normal.

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BEHAVIOR OF STRYCHNINE IN THE ANIMAL BODY. Robert A. Hatcher and Cary Eggleston. Copied from the *Jour. of Pharmacology & Exp. Therapeutics*, Vol. IX, March, 1917, No. 6, p. 359.

The authors conclude from their experiments in which biologic tests were used for the estimation of strychnin, that the poison is eliminated only to a slight extent in the urine of the cat, dog and guinea pig, not at all in the feces in normal conditions, but that it disappears fairly rapidly from the organism, being destroyed for the greater part by the liver, as shown by the results of perfusion experiments with the liver of the dog. REICHEL.

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EARLY WORKERS ON ANTHRAX. Copied from *Jour. of A. M. A.*, Vol. LXVIII, No. 18, May 5, 1917, p. 1340.

*To the Editor*—Please let me know whether the following men were veterinarians or physicians: Chabert, 1780; Barthelemy, 1823; Rayer; Davaine, 1849; Pollender, 1850; Delafond, 1860; Solleysel, 1664. I have given the dates approximately when they wrote. All but Solleysel were concerned in the early work on anthrax; he worked on glanders.

(Signed) MAZYCK P. RAVENEL, M.D., Columbia, Mo.

*Answer*—Chabert, Barthelemy, Delafond and Solleysel were veterinarians.

Dr. Pollender, a physician at Wipperfurth, Rhenish Prussia, wrote the memoir on microscopic and microchemical investigation of the blood in anthrax: "Mikroskopische und Microchemische Untersuchung des Milzbrandblutes, sowie über wesen und Kur des Milzbrandes" (*Vrtljschr. f. gerichtl. u. öffentl. Med.*, 1855, 8, 103-114).

Casimir-Joseph Davaine, born at St. Amand-Les-Eaux in 1811, graduated from the Paris Medical Faculty with the Dissertation "De l'hématocèle de la tunique vaginale" (1837); became a member of the Académie de Médecine (1868) and wrote a memoir, crowned by the Institut, entitled, "De la paralysie générale ou partielle des deux nerfs de la septième paire" (1852), but never held a public position. He wrote much on the entozoa, his principal contribution being "Traité des entozoaires et des maladies vermineuses de l'homme et des animaux domestiques" (1860). His greatest contribution in his study of the bacteriology of anthrax: "Recherches sur la nature et la constitution anatomique de la pustule maligne" (*Compt. rend. Acad. d. cc.*, 1865, 40, 1296-1299). He died at his estate at Garches (Seine-et-Oise), Oct. 14, 1882.

Biographical references:

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Pierre-Francois-Olive Rayer, born March 8, 1793, at St. Sylvain (Calvados), studied in Paris, at the l'école pratique, Hotel Dieu and Maison royale de Santé, graduated with the degree of M.D. in 1818, and became a member of the Académie de médecine (1823), and physician to the Bureau central des hopitaux (1824), Hopital St. Antoine (1825) and Hopital de la charite (1832). He succeeded Magendie as president of the Comité consultatif de l'hygiène publique (1843), and became consulting physician to Louis Philippe (1848) and professor of comparative medicine and dean of the Paris Faculty (1862). He died at Paris, Sept. 10, 1867. His greatest works are his treatise on diseases of the kidneys (1839-1841) and the skin (1826) and his classical monograph on glanders and farcy (*De la morve et du farcin chez l'homme*, Paris, 1837). He also wrote a history of the epidemic of sweating sickness of 1821 (1822), a memoir on delirium tremens (1819), a report on the origin of the Barcelona epidemic of hematuria endemic in Mauritius (1839). He became co-editor of the *Rèvue médicale* in 1822 and of the *Journal universelle et hebdomadaire de médecine* in 1830.

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REICHEL.

—The wedding of Miss Augusta Wolfe Russell and Dr. Archibald R. Ward of the Bureau of Animal Industry, occurred July 25, at Forest Park, Md. They will be at home at The Mendota, Washington, D. C., after September 1.

—Dr. D. F. Hinckley has resigned as State Veterinarian of Oklahoma and removed to Watonga, Oklahoma.

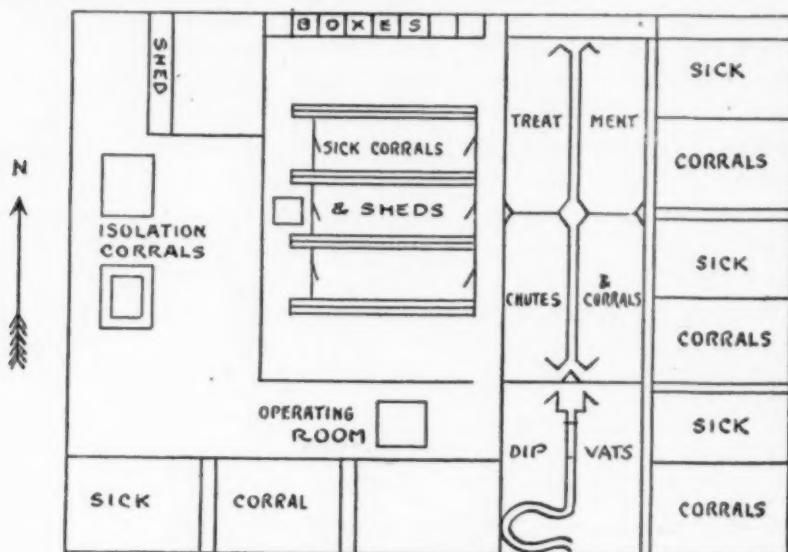
—The death of Dr. John M. Mitchell of Madison, N. J., has been announced.

## ARMY VETERINARY SERVICE

### REPORT ON VETERINARY DEPARTMENT AUXILIARY REMOUNT DEPOT, FORT BLISS, TEXAS

FIRST LIEUT. A. L. MASON, Veterinary Corps, Chief Veterinarian

1. **ORGANIZATION:**—The Veterinary Department of the Auxiliary Remount Depot occupies a space 470 feet by 765 feet in the northwest corner of the depot and consists of two buildings; a dispensary and an operating room, four sheds, twenty box stalls, and a system of corrals, including two treatment chutes, a dipping vat and isolation pens. The ground plan is as follows:



2. **PERSONNEL:**—6 veterinarians, 27 enlisted men, (2 Sgts., 5 farriers, 20 privates), 7 civilians, (1 foreman, 1 leader, 1 corral rider, 4 helpers), 9 laborers.

3. **RECORDS:**—A record of supplies received and issued, a daily ward record, and a record of animals received.

4. **REPORTS:**—(a) individual sick report of animals, (b) ward reports, (c) surgeons report, (d) report of veterinarian issuing and receiving point, (e) report of corral rider, (f) consolidated report of veterinarian in charge.\*

5. All animals, as soon as they enter the hospital, are placed

\*Appended

on a picket line, and as soon as their case is diagnosed they are supplied with a neck strap bearing their hospital number and a *linen tag* (colored) with the diagnosis and a synopsis of the future treatment they are to receive. They are then assigned to the proper ward. As soon as an animal is able to be treated in the sick corrals, it is assigned there and during the convalescence is treated in the chutes.

6. Animals are grouped according to disease, and as nearly as possible, assigned to corrals in groups. The following arrangement has been found satisfactory at this depot: surgical cases, influenza and strangles cases, pneumonia cases, eye cases, skin diseases, convalescing surgical and medical cases and isolation pens for glanders. No cases are retained in the stables unless they are unable to walk.

7. During the six months following April 1st, 1916, conditions were such that it was impossible to properly care for the sick. Large numbers were being received and issued daily, and facilities for caring for them were inadequate. Referring to Chart II, it will be seen that during April, May, June, July, August and September, 1916, the mortality was nearly .7 per cent per week of the number of animals on hand. This excessively high death rate was due mainly to shipping fever and its complications.

8. SHIPPING FEVER: Shipping fever and its complications, pneumonia and purpura hemorrhagica, caused more trouble than any other disease. In our opinion at least 75% of the deaths were either directly or indirectly due to this disease. During the first six months of the establishment of the depot, there were 540 deaths, out of a total of 856 recorded, due to this disease and its complications. These 540 deaths were divided as follows: 337 due to pneumonia, 17 due to purpura hemorrhagica, 99 to uncomplicated influenza and strangles, 5 to congestion of the lungs, and 82 to septicemia, pyemia and unclassified causes. Such complications as occlusion of the lacrimal duct, infection of the facial sinuses, fistulas of the withers, paralysis of the recurrent pharyngeal nerve, (roaring), and strictures of the trachea due to tracheotomy in purpura hemorrhagica, are a few of the diseases which are directly due to shipping fever.

GASTRO-INTESTINAL COLICS—The majority of the colics were due to animals gorging themselves on grain, and consisted of gastric and intestinal flatulence and impaction. A few cases were due to



ingestion of sand and a few resulted in rupture of the diaphragm and stomach. Gastric and intestinal flatulence accounted for most of the deaths, as 99 out of 132 died from this cause.

**CONTAGIOUS PLEURO-PNEUMONIA**—An outbreak of this disease was discovered in one crowded corral late in January, but luckily stamped out before many animals were exposed.

**TETANUS**—3 cases of tetanus were encountered during the year. One of these was undoubtedly infected in our corrals. The other two were imported, one from Nogales and the other from the stockyards of El Paso. Of the three, one recovered.

**INFECTIOUS ULCERATIVE STOMATITIS**—An outbreak of this disease was encountered during November and December in the Regular and Militia camps in this vicinity, but luckily the Remount Depot escaped.

**INFECTIOUS CONJUNCTIVITIS**—This disease has been present during most of the winter and spring. Undoubtedly the infection is carried by the wind, on small particles of manure. It gave considerable trouble during the windy season and interfered somewhat in the testing for glanders with ophthalmic mallein, however, its interference with the reaction of the mallein did not materially delay the testing, as it was soon found that the inflamed conjunctiva was not affected by the mallein.

**SKIN DISEASES**—Several cases of ringworm appeared in the late summer and early fall. By the first of November we had about 500 cases. As the dip had not been constructed these cases were treated by the local application of iodine tincture. This necessitated considerable expense and labor, and was too slow and uncertain in its results. With our present facilities we need fear no further trouble from this source.

Mange has started to make its appearance within the last month. At present we have about ten cases under treatment. One of these is sarcoptic or red mange, the remaining cases are psoroptic.

Lice were first noticed in January. As it was too cold to dip the animals at that time, the worst cases were treated in the hospital. Since the middle of March all the animals have been dipped at least twice and some three and four times. At present very few of the animals are suffering from these parasites. These are being clipped as rapidly as our limited clipping facilities will allow.

**GLANDERS**—Since our special report on glanders (January 18, 1917) we have destroyed 38 animals, making a total of 61 head since the origin of the present outbreak. Over 30,000 doses of

ophthalmic mallein have been administered and the complement fixation test taken in about 200 cases, where the ophthalmic mallein test was doubtful or suspicious. Practically all of the cases destroyed were detected and isolated before they showed any clinical symptoms. Several of these, probably about 30, contracted the disease while in isolation with those having the disease. All animals placed in isolation were divided into three groups and none released until we were certain they were free from the disease. The last complement fixation test was completed May 14th and 64 animals were released from quarantine. The remaining 6 animals will be kept in isolation for another month, as they showed suspicious reactions. However, these reactions may be due to the previous administration of subcutaneous mallein.

**SURGICAL DISEASES**—The surgical diseases may be divided into two classes, those due to injuries, viz., splinters, kicks, nail pricks, and accidents and those which resulted from disease. Referring to the table, it will be noticed that during the last 4 months the surgical diseases under treatment in the hospital were nearly one-half of the total sick report. Of these over 90% were due to splinters, kicks and nail wounds. The forequarters being the location of nearly one-half the injuries, the hindquarters one-quarter, the balance divided between the head, neck and trunk. Nearly all of these cases are preventable.

8. An analysis of our records and sick reports for the past year shows strangles and influenza, (shipping fever) including their complications caused the greatest mortality during the past year, while injuries due to splinters, kicks and nail pricks accounted for most of the hospital cases since January 1st, 1917. The contagious skin diseases, ringworm and mange, will undoubtedly cause more or less trouble during the coming summer and fall, but with the present facilities for dipping should be held in check.

9. An outbreak of glanders occurred during the past year and gave considerable trouble between November and March. However, at the present time we are practically free from any further trouble in this direction. The last case showing clinical symptoms was destroyed in April. Previous to this there had not been any cases showing clinical symptoms since early in March.

10. The most serious trouble confronting us from now on will be the control of shipping fever when newly purchased animals begin to arrive. Charts Nos. 1 and 2 show graphically what happened last year shortly after horses began to come in to the depot, and

we can reasonably expect the same conditions this year. Overcrowding and insanitary corrals will be the worst evils we have to contend with. While the veterinary department is capable of easily handling 600 to 800 sick animals per day, plenty of room, good hay and clean corrals will do more to reduce the mortality than medicine, after the animals are once infected.

11. Considering the cost, in animals, caused by shipping fever when newly purchased animals are received, it seems to us that something could be done along the lines of preventive treatment, especially when its control would mean so much to the Army under the present circumstances. It is an established fact that the main sources of infection are in the large horse and mule markets and the stock yards and cars of the carriers. Therefore we should begin at the time when animals are purchased by immunizing them against the infection and at the same time have the above mentioned sources of infection cleaned up, either by ourselves or the Bureau of Animal Industry, which is well organized and in a position to do the work effectively.

TABLE No. I

MONTHLY REPORTS ON DEATHS FROM MARCH 15th, 1917, to APRIL 25th, 1917

Month 1916	Cav. Horses	Art'y Horses	Wheel Mules	Load Mules	Pack Mules	DESTROYED		TOTAL
						Incurable	Glanders	
April	12		1		1			14
May	24		1		2			27
June	11	3	5		2			21
July	54	16	4					74
August		237	93		29			359
Sept.	105	55	1	2				163
Oct.	40	16	2	2		2		62
Nov.	26	18	2	1				47
Dec.	14	9	1	2		4-IC 1-W	7	38
1917 Jan.	15	6	1	2		2-C 1-A	17-C 3-A 10-WL&P	57
Feb.	7	3	1			2-C 1-A 2-L	3-C 2-L	21
March	6	7	2	2	1	2-C 2-A	7-C 2-A 3-L	34
April	8	7	1	3	1	2	1	23
TOTAL	322	377	115	14	36	21	55	940

TABLE NO. II  
DAILY AVERAGE OF ANIMALS ON SICK REPORT FROM JANUARY  
1st, 1917, to MARCH 30th, 1917

		Jan.	Feb.	March	April
Medical Cases	Shipping Fever and its Complications	40.0	32.0	49.7	
	Gastro-Intestinal Diseases	3.3	1.6		.7
Surgical Cases (Mostly injuries received in cor- rals)	Eye Cases, Both Medical and Surgical	19.1	9.1	3.8	
	Head	16.4	9.8	6.2	11.9
	Neck	4.3	2.8	3.4	4.5
	Forequarters	65.5	49.1	26.4	25.3
	Hindquarters	30.6	30.0	17.7	18.2
	Trunk	2.6	1.5	3.8	4.8
	Total Daily Average, Surgical	119.7	93.5	57.7	64.7
	Convalescents (Med. & Surg. not included above)	60.3	10.8	115.61	134.4
	Entered	9.3	10.3	5.7	5.6
	Discharged	19.4	7.2	4.1	10.8
	On Sick Report	196.2	173.7	237.00	264.6

TABLE NO. III

In 856 deaths reported, the following table gives a general idea of the proportion caused by the different diseases:

540 deaths were due to shipping fever.

132 deaths were due to gastro-intestinal diseases.

61 deaths were due to glanders.

2 deaths were due to tetanus

46 deaths were due to injuries received in corrals, including kick wounds, nail pricks, broken bones, etc.

75 deaths were due to cause not ascertained.

TABLE NO. IV

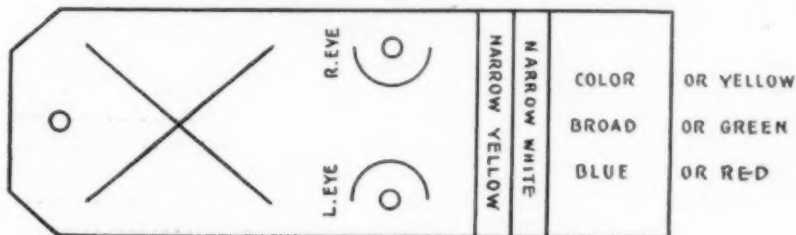
Of 540 deaths due to shipping fever, the direct cause was as follows:

337 due to pneumonia.

99 due to different forms of strangles and influenza.

5 due to congestion of lungs.

82 due to septicemia, pyemia and miscellaneous causes.



LINEN TAG WITH COLOR STRIPES

COLORS AND MEANING. LINEN TAG (colored)

One broad blue—Hospital Case.

One broad blue, One narrow white, One narrow yellow—Influenza or Distemper and Complications.

*One broad blue, One broad green*—Surgical Cases.  
*One broad blue, One broad red*—To be placed before inspection.  
*One broad blue, One broad yellow*—Influenza and Distemper Thoracic Complications.  
*One broad blue, One narrow white, One narrow green*—Lameness.  
*One broad blue (cross) X, Double diagonal (cross) (Stray in Hospital)*—Loose horses that run away from organizations, etc.  
*One broad blue, One narrow yellow, One narrow green*—Influenza or Distemper Surgical Complications.  
*One broad blue*—Two eyes, left—right. Eye cases.

### U. S. A. AUX. REMOUNT DEPOT

#### DAILY SICK REPORT FOR VETERINARIAN IN CHARGE

Date....., 1917.

No. Animals Inspected for Entrance .....  
 No. Animals Malleined .....1.....  
 No. Suspicious Reactions .....  
 No. Animals Inspected for Issue .....

#### REMARKS

.....

INFLUENZA OR STRANGLES.....TOTAL.....

Pectoral .....

Cellulitis .....

Catarrhal Strangles .....

COMPLICATIONS .....

#### SKIN DISEASE

Ring Worm .....

Mange .....

#### COLICS

Gastric Flatulence .....

Gastric Impaction .....

Intestinal Impaction.....

Intestinal Flatulence .....

#### SURGICAL DISEASES

Head .....

Neck .....

Fore Quarters .....

Hind Quarters .....

Trunk .....

MISCELLANEOUS .....

ENTERED .....

DISCHARGED .....

DIED .....

TOTAL IN HOSPITAL .....

Signed.



## SICK REPORT PUBLIC ANIMALS

Hoof No. .... Class. ....  
 Ward No. .... Sex. ....  
 Entered ..... Discharged. ....  
 Diagnosis .....  
 Prognosis .....

## DAILY TREATMENT AND REMARKS

.....  
 .....  
 .....  
 .....

## U. S. A. AUX. REMOUNT HOSPITAL

## WARD REPORT

Date....., 1917

## INFLUENZA OR STRANGLES

Pectoral .....  
 Intestinal .....  
 Cellulitis .....  
 Muscular .....  
 Catarrhal Strangles .....  
 Glandular Strangles .....

## COMPLICATIONS

Pneumonia .....  
 Purpura .....  
 Laminitis .....  
 Cerebral or Spinal Contagious Pneumonia .....

## SKIN DISEASES

Ring Worm .....  
 Mange .....

## COLICS

Gastric Flatulence .....  
 Gastric Impaction .....  
 Intestinal Impaction .....  
 Intestinal Flatulence .....

## SURGICAL DISEASES

Head .....  
 Neck .....  
 Fore Quarters .....  
 Hind Quarters .....  
 Trunk .....

## MISCELLANEOUS

ENTERED .....  
 DISCHARGED .....  
 DIED .....  
 TOTAL IN HOSPITAL .....

## REMARKS

.....  
 .....  
 .....  
 .....

Signed.

## AUXILIARY REMOUNT DEPOT

## VETERINARY DEPARTMENT

Corral Rider's Daily Report.....

Date....., 1917

Corral No.	Hoof No.	Remarks
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

NAME .....

....Corral Rider.

## U. S. A. AUX. REMOUNT HOSPITAL

## CORRAL VETERINARIAN'S SICK REPORT

Date....., 1917.

## TOTAL

On Sick Report .....  
 Received from Wards .....  
 Discharged for Duty .....  
 Influenza Cases .....  
 Surgical Cases .....  
 Lameness .....  
 Eye Cases .....  
 Skin Disease .....

## TOTAL ANIMALS IN CORRALS

F. 12—Released to Duty .....  
 G. 4—Clearing Corral .....  
 G. 7—Horse to be I. C. ....  
 G. 8—Eye Cases Under Treatment.....  
 G. 9—Observation .....  
 G. 10—Observation .....  
 G. 11—Sick .....  
 G. 12—Sick .....  
 H. 7—Sick .....

## REMARKS

.....  
 .....  
 .....

Signed.

—VETERINARY RESERVE CORPS. There is a prospect, in the near future, that a limited number of commissions, up to and including major, may be given to experienced men for the veterinary officers' reserve.

—Dr. Roy C. Smith of Enid, Okla., has received his commission as reserve veterinarian and has reported for duty with the 6th Cavalry at Marfa, Texas.

## OPEN MARKET PURCHASE AUTHORIZED OF ANIMALS NEEDED BY THE GOVERNMENT FOR WAR PURPOSES

The Quartermaster General of the Army authorizes the following:

The Secretary of War has approved of the purchase in the open market of the mature specification animals needed by the Government for war purposes.

1. Any responsible dealer, breeder, or farmer who is capable of supplying the Government with one or more carloads of animals at a sanitary place, suitable for feeding, inspecting, branding, and loading them on cars is invited to furnish the following information to the purchasing officers in the remount zone in which he is located or proposes to supply animals:

(a) The number of mature specification animals of each of the following classes that he can supply: Cavalry and riding horses, light artillery horses, heavy artillery horses for siege batteries, wheel mules, lead mules, and pack mules.

(b) The price per animal at which he will enter into an agreement to supply animals of each class to the Government if called upon to do so.

(c) The places where he proposes to offer animals for inspection by Army purchasing boards.

2. Full particulars as to the specifications of animals, method of inspection, and requirements of inspection plants will be furnished on application to the purchasing officer of any one of the zones.

3. The Government purchasing officers charged with the details of buying horses and mules for the Army are as follows:

Depot quartermaster at Fort Keogh remount depot, Fort Keogh, Mont., for the northern remount zone, embracing the following States: Idaho, Minnesota, Montana, North Dakota, Oregon, South Dakota, Utah, Wisconsin, Wyoming and Washington.

Quartermaster at 410 Scarritt Arcade Building, Kansas City, Mo., for the central remount zone, embracing the following States: Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri and Nebraska.

Depot quartermaster, Fort Reno remount depot, Fort Reno, Darlington, Okla., for the southern remount zone, embracing the following States: Arkansas, Arizona, California, Louisiana, Mississippi, Nevada, New Mexico, Oklahoma and Texas.

Depot quartermaster, Front Royal Remount Depot, Front Royal, Va., for the eastern remount zone, embracing the following States: Alabama, Connecticut, Delaware, District of Columbia, Florida, Georgia, Kentucky, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, and West Virginia.

4. No agreement to furnish animals will be made with any dealer unless he is considered capable of supplying all the animals he offers to supply without sub-letting or calling upon other agencies to assist him.

5. At least one purchasing board in each zone will be reserved for the inspection of animals offered by farmers and breeders in not less than carload lots.

6. A bond of 5 per cent of the total consideration will be required as part of the agreement on any order for more than a hundred animals. At the end of each day's business a voucher for the purchase price of all the animals bought that day will be furnished the seller. The total value of this voucher will be paid on presentation to the purchasing officer of the remount zone in which the animals are delivered.

7. Under agreements to furnish 100 animals or less no bond will be required but 5 per cent of the purchase price will be deducted from the amount of the voucher for each day's business and will not be paid until all the animals are delivered.

#### COMMITTEE ON PUBLIC INFORMATION.

—ADVISORY BOARD FOR ARMY VETERINARY CORPS NAMED. In reorganizing the Veterinary Corps of the Army Medical Department, the Surgeon General has selected the following veterinary advisory board: Dr. C. J. Marshall, State veterinarian of Pennsylvania; Dr. David S. White, dean of the College of Veterinary Medicine, Ohio State University, Columbus, Ohio; Dr. Louis A. Klein, dean of the School of Veterinary Medicine, University of Pennsylvania; Dr. V. A. Moore, dean of the New York State Veterinary College, Cornell University, Ithaca, N. Y.; Dr. John R. Mohler, assistant chief of the Bureau of Animal Industry, Washington, D. C.

These men are chosen largely from the committee on military service appointed by the American Veterinary Medical Association. They are experienced in administrative work and are familiar with the veterinary problems of the country. One of them, Dr. C. J. Marshall, has spent some months in studying the operations of the veterinary service in the French and English Armies at the front.

The board is studying the veterinary needs of the Army under the present emergency and will make recommendations to the Surgeon General in regard to the organization and personnel of this corps.

According to the present plan, several hundred thousand horses and mules will be needed for the Army. The conservation of the

health of these public animals; the prevention of infections; the care and treatment of the sick and injured; the inspection of forage; the physical examination of all public animals before purchase; the sanitation and hygiene of corrals, animal depots, and hospitals; the transportation of horses and mules by rail and by sea; the supervision of the shoeing; the inspection of meats for the Army; and the necessary bacteriological and pathological work will require an immediate expansion of the Veterinary Corps.

Based on the experience in the French and English Armies, as to the number of veterinarians required per thousand of public animals, the Army will need a thousand or more veterinarians, depending upon its size.

As there are only about 120 veterinary officers in the regular Veterinary Corps, the large majority must be obtained from civil life.—*Official Bulletin, Washington, D. C.*

—Doctors J. R. Grigsby and E. M. Rundall have commissions as second lieutenants in the Veterinary Reserve Corps, and expect soon to see service in France.

—Dr. Robert H. Sewell, formerly of Hiawatha, Kans., is in the Army Veterinary Service and expects soon to render service in France.

—First Lieutenant Roy B. Whitesell, formerly of LaFayette, is stationed at Fort Benjamin Harrison, Indiana.

—Newspaper reports state that a veterinarian of Philadelphia has devised an artificial leg and crutch by the use of which he thinks many crippled horses and mules can be restored to service. The apparatus is made of tubular steel with a special quadrant spring imitating the vertical and lateral flexing of the ankle and fetlock. Instead of killing horses crippled on the battlefield, he believes that, with this device, many can be saved for light farm work, for breeding or to fatten for butcher meat.

—Dr. Ralph M. Bell, formerly of Utica, N. Y., is now stationed at Fort Reno, Okla., as 2d Lieutenant in the Veterinary Reserve Corps.



## ASSOCIATION MEETINGS

### AMERICAN VETERINARY MEDICAL ASSOCIATION

#### PRESIDENT'S ADDRESS

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CHAS. E. COTTON, V.M.D., Minneapolis, Minn.

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*Members of the American Veterinary Medical Association and Friends:*

Your committee on reorganization, in framing the new Constitution and By-laws, performed at least one kind act in providing that at the regular meeting the president shall deliver a *short* address. As the result of your kindness in conferring upon me the highest honor in the gift of the association, it becomes my duty and privilege to speak freely of the problems and conditions facing us during these momentous times.

I again express to you my sincere appreciation of this great honor. I wish also to acknowledge and thank the officers, members of the committees and the association for their loyal support and valued services. I cannot refrain from mentioning especially the untiring aid and team work I have received from Secretary Merillat, Treasurer Schneider and Editor Fish.

Our secretary has been painstaking and untiring in his efforts to promote the welfare of the association. He has succeeded in placing his office on a sound business basis.

The Constitution and By-laws fails to provide for any remuneration for the treasurer but it requires that he furnish a large bond. He is now keeping separate accounts and funds for the secretary's office and for that of the *Journal*. All bills must be itemized and paid by warrants on the submission of vouchers signed by the president and secretary. These duties require time and careful attention. The Constitution should be so amended that the treasurer shall receive a nominal salary.

Editor Fish is conscientiously striving to publish a journal of interest to every member of this association and to every progressive practitioner. I am sure that at times he becomes discouraged. He is not only the editor but also the business manager. He has other duties to perform in his college work and cannot possibly get out and come in contact with the members of the profession. You will all acknowledge that he is today publishing the best and

strongest veterinary journal ever published in this country. How easy it is for some of us to criticize, but let us put ourselves in his place. It is not a one-man journal nor is it published for any one's personal gain. It is your journal and mine and we should do everything possible to make it a success. We should submit articles, case reports of experiences in the field of practice and all available papers of value. Each State Secretary should act as a representative of the *Journal* in his respective state, consider it his duty to secure papers presented before the local and state societies and strive to secure subscribers and advertisements.

The reorganization, under the new Constitution and By-laws adopted at the last annual meeting, has caused numerous difficulties and new problems. The conduct of practically all business of the association was placed in the hands of the Executive Board and the Constitution also directed that this board should make "all necessary regulations for carrying into effect the provisions of the Constitution and the By-laws." It required five months before the Executive Board could be elected. There were a number of vital questions connected with the offices of the secretary, treasurer, and the *Journal*, which we thought should be solved immediately. I did not wish to assume the responsibility of deciding these questions. After consulting a number of the members who had held high offices in the past, and also obtaining the opinion of a most able constitutional attorney, I appointed an "ad interim" Executive Board to serve until their successors could be elected. Representative men from the five districts as prescribed by the Constitution were selected and, for the sixth or member at large, I appointed Veranus A. Moore to serve until his successor is elected at this meeting. This Executive Board met in Chicago, on December fifth, outlined and decided the business affairs of the offices and sanctioned the steps taken for putting into effect the provisions of the Constitution and By-laws.

Immediately following the last annual meeting, the secretary proceeded with the arduous duty of the election of the Executive Board, which was completed in February.

We have had to decide a number of questions which were of vital moment to the success of the reorganization and which could not be postponed for sanction by the Executive Board and the Association. We have thus succeeded in putting into effect the provisions of the new Constitution and By-laws.

Heretofore a complete change in the personnel of the offices and committees has been made each year. Members have assumed these important positions without preparation or a knowledge of the work, and by the time they have become familiar with the duties and outlined definite policies or made recommendations to the association other men have been elected or appointed in their places. Too frequently recommendations of the committees have been accepted by the association, published in the proceedings and there buried, never to be resurrected. The reorganization will succeed in putting the association on a more stable basis and will make for greater efficiency in the carrying out of our aims and deciding the problems confronting us. The administrative body and the important committees are more permanent and they will now be able to put into effect the various policies and changes recommended by the association from year to year.

The Constitution and By-laws, as a whole, reflect credit on the committee of reorganization. After the year's experience in striving to carry out the provisions, we find there are a number of changes necessary to correct the ambiguities and conflictions of some of the paragraphs and sections. There are also some changes and additions which, in the opinion of the officers, are necessary. As time will not permit me to enumerate them, they have been referred to the Executive Board, which I trust will make the proper recommendations to the association.

Our secretary found, after consulting attorneys, that we had no legal status, that the bonds of our officers are worthless for the protection of our association and that we could not continue to safely transact business and publish the *Journal* unless we were incorporated. Any four or five men could apply to any state in the Union and obtain a charter under the name of the American Veterinary Medical Association and prevent this organization from continuing the use of the name. At the annual meeting in 1915 it was almost unanimously voted to incorporate the association. Why the officers who preceded us did not act according to this instruction, I do not know. We decided that we were taking too great risk in deferring action longer and applied for incorporation and were granted a charter by the State of Illinois.

Shortly after my election, in view of the world conditions existing at that time and the possibility that our country would be forced into this awful war, and realizing that we, as a profes-

sion should show our loyalty and do our part in the preparedness, I referred the question to the Executive Board. They empowered me to take such action as I deemed necessary. The veterinary corps in the regular army had been organized by the medical corps. Many more veterinarians would be required, necessitating the organization of a veterinary reserve corps.

I appointed C. J. Marshall, of Pennsylvania, as chairman of a special committee on Army Veterinary Service and requested him to select the other members of the committee. When later it was declared that a state of war existed, the committee found they were facing a hard proposition in obtaining proper recognition of our profession in the organization of a veterinary reserve corps. As a result of the able and energetic work of Dr. Marshall and his colleagues, the outlook now is very encouraging for the officers of the veterinary officers reserve corps to attain the same rank as is given to officers of the medical reserve corps. If ever a committee's work deserved success and recognition, that of the special committee on Army Veterinary Service deserves it at this time. They have given their time and money unstintingly, untiringly and unselfishly. Dr. Marshall was compelled, at a critical time in the progress of the work, to undergo a serious operation and Dr. V. A. Moore, of New York, loyally volunteered to do his part and was placed as an adviser in the office of the Surgeon General to assist in the organization of a veterinary officers reserve corps. We will await the report of this committee with great interest.

This is the first time in the history of this association that we have convened under such conditions as at present prevail. The existence of our country is in the balance and I wish to urge all the members of the association and all members of the veterinary profession to show their patriotism and do their part in the support of the Government. We must act as a unit in the defense of our country and of world democracy. We must supply veterinarians for the Army, and food inspectors for the Army and Navy. We must also advise and assist in the conservation of the breeding and food producing animals. This can be accomplished by encouraging the farmers to raise a larger number of heifer calves and ewe lambs for breeding purposes, by advising them in regard to prevention and control of infectious diseases of domestic animals and fowls, and by encouraging them in the breeding of horses.

No war can be successfully waged without the use of horses

and mules. The success of artillery depends upon its mobility. The transportation of ordnance and food in the present world conflict depends to a great extent upon animals. In the month of July it was reported that the English Veterinary Service had accommodations for the care of only forty thousand animals and had seventy thousand as patients and were crying for more veterinarians. Our army will require the services of many efficient veterinarians and I wish to urge all of you who are able, to volunteer your services.

I would recommend that this association send a message to President Wilson, offering our services as a unit in this conflict.

America should assume leadership in the brotherhood of veterinarians. The veterinarians of Belgium, France and England and their families are suffering and many of them are in want. Before another year passes we may have the same conditions in the profession of this country. I hope that at this meeting some provision will be made for the establishment of a fund to help our brothers and their families. Practitioners who remain at home should volunteer to take care of the practices of their neighboring colleagues who have volunteered their services.

After reading the addresses of my distinguished predecessors, I have been impressed with their optimism in regard to the growth and accomplishments of this organization. Practically all of them have extolled the association and told us of the wonderful things that have been accomplished and what a great future is in store for us. I do not wish to convey the impression that I am a pessimist or pessimistic as to the future of this association. Our aim should be to help the veterinary profession and this association; to uplift our standards and advance our efficiency. I feel keenly our weaknesses and I appreciate the wonderful advances we have made in the past thirty years. We want progress for all and misfortune for none, and, above all, we want harmony. However, I think it is time that our attention be called to some of our weaknesses and shortcomings.

This association has twenty-six hundred members when it should have fifteen thousand. There are twenty thousand veterinarians in America. Why does this apathy exist? Is it the fault of the association or the individual members of the profession? I am satisfied that it is due to the apathy of the profession and the indifference of the practitioner. It is true that we have the ma-



jority of the representative leaders of our profession as members, but we should do something to institute a campaign to induce all worthy men in the profession to become members. If they wish to keep abreast of the progress that is being made in veterinary science they should become members of their state and of this association, where they can affiliate with, obtain the thoughts and take advantage of the achievements and high aims of the leaders in the profession. They owe it to themselves and to their profession to give their allegiance and support to this association.

The activities of veterinary practitioners are coming to be more and more restricted to the dairy and breeding districts. The inroads that have been made upon the use of the horse by gasoline motors are more than compensated for by the increase in the value and importance of the food producing animals. The opportunities for veterinarians who do not desire to practice are likewise enhanced. The Bureau of Animal Industry is constantly extending its work in meat and live stock sanitary control and adding to its forces large numbers of veterinarians. Our state veterinary services are in need of highly trained clinicians, pathologists and sanitarians. The army veterinarian has finally been recognized by Congress. This has not only made attractive positions but also given excellent opportunities for a number of ambitious and properly educated young veterinarians. The Surgeon-General and the medical advisory board of the Council of National Defense have recognized our special committee on Army Veterinary Service in its efforts to obtain suitable organization for the Army Veterinary Officers Reserve Corps. The veterinarian of the future must be a man well trained to fill these positions. If he is recognized as a professional man by the members of other learned professions he must have the same standard of education, culture and efficiency.

The time of the horse doctor has passed. The old plaintive argument that the country needs practitioners and that we wish to give the poor uneducated country boy a chance to enter the profession in order to meet the crying needs of the farming communities, has become threadbare and stale. All the other professions have closed their doors to this standard of preparation. There is now no reason why this young man cannot obtain the preliminary education, provided he is made of the right kind of stuff. Many of the men who stand out as leaders in our profession have been reared in country districts, have had to earn their way through

preparatory schools and colleges before entering upon their veterinary studies, and what is equally significant, they have continued to be students and investigators. The progressive and successful farmer and breeder of today is a student of animal husbandry, has a knowledge of breeds and types of animals, of feeds and feeding, and in many instances he has pursued courses on the nature of diseases, especially the infectious ones. The veterinary practitioner, if he expects to succeed, must not only do the work for these owners but also obtain their respect and confidence. To do this, the practitioner of veterinary medicine must be a man of broad knowledge and thoroughly trained in his technical subjects. This necessitates his obtaining a general as well as a technical education.

The examinations conducted by the various State Veterinary Medical Examining Boards and the Bureau of Animal Industry in the past few years, have resulted in the failure, in some instances, of as high as seventy-five to ninety per cent of the candidates. The results of the examinations of the Minnesota State Veterinary Examining Board in the past six years show conclusively that the trouble lies in lack of preliminary training, for in practically every case where a man failed in his preliminary examination he failed in one or more of the technical subjects. Our Constitution states that one of the objects of the association is to elevate the standard of veterinary education. Are we doing our duty? Why not face the condition truthfully, squarely and sanely? Do we want our professional ranks to be filled with men of this type, men who could not possibly enter any of the other professions? If we wish the standard of our profession to be kept low, then we should continue in our apathy and remove this section from our Constitution and no longer call ourselves associates of professional men.

A number of the schools of veterinary medicine demand a high school training as the minimum requirement for entrance, while others require as a minimum an examination which, if an immature child in the sixth grade of our common schools was unable to pass, would prove that he lacked mental capacity. That we can expect men of such low mental training and education to be able to intelligently study the science of medicine and the allied subjects, is beyond human comprehension, and still we have men, recognized as leaders in this association and profession, who claim that this is the type of men who are more capable of passing state

board examinations and who make better practitioners than many younger men that have had high school educations.

The members of this association are divided into two groups, the supporters of private schools and those who believe that veterinary education is the function of the state and who recognize that the necessary facilities for preparing practitioners cannot be obtained from the fees that the students are able to pay. This is unfortunate. While we recognize that in the beginning of veterinary education in this country private schools did a valiant work we are compelled to recognize that during later years they have not kept up the educational pace beyond that necessary to comply with the letter of the requirements for membership in this association. There are schools which are purely private enterprises, mere schemes under the pretense of a veterinary education to make money for their promoters and they cannot be honestly designated as veterinary educational institutions. Commercialism and not efficiency seems to have been the motive of their founders. The demands of the profession and the needs of the country for a better service do not seem to have been taken into account.

The standard of the profession is not judged by the leaders but by the general average of those holding a veterinary degree. We have had "big men" from poor schools and vice versa, but the good schools graduate more big men and the poor schools graduate more failures. The average student will comply only with the requirements of his school, but the energetic student will go beyond these and will advance in spite of his school. There is no college from which every graduate is a success, nor is there a school whose graduates are all failures. It is up to the individual, his energy and his desire for knowledge.

The professional schools of medicine, engineering, law and veterinary medicine, and also our high schools and colleges are better today than a generation ago and they are turning out higher grade men. The veterinary schools have progressed less than any of the others, but our advance has begun and *it will continue*. Our sister profession of medicine, through the influence of the American Medical Association, has placed all the accredited medical schools on a basis of minimum entrance requirements which are at least two years of college work, and the best ones require the successful completion of a four year college curriculum. This advance has been accomplished since 1904. Many of the colleges of

law and engineering now require from one to four years of collegiate work as a preliminary training. The result is that better prepared men enter these professional institutions and when they graduate they are recognized, not only in our own country but also abroad. Why should our veterinary colleges be inferior to those of other professions?

The young man of today after he has completed his high school work or collegiate course, finds it a difficult task to make his choice of a profession. Our profession is comparatively new in America and it offers great possibilities for service to mankind as well as for personal advancement. Other conditions being equal we cannot expect any young man with such an education to enter the profession when he finds our standard of requirement is comparatively so low. He will not wish to lower himself to that standard, but naturally will choose the profession that requires a high standard of education.

Let us look back and see what this association has accomplished. In 1907 we undertook to raise the standard of veterinary education by securing a uniform degree. This was only a partial success, as some of the schools which demanded entrance examinations equal to that of a high school, and others a high school preparation and three years of actual training, did not look favorably on the proposition. In my opinion they had the right conception, for even today, in the estimation of the public, men who are licensed to practice veterinary medicine, whether they are graduates of a high or low type of school, or any school, are looked on as of the same plane of professional quality. We must educate ourselves to the duties and obligations we owe to our profession and to the community. When we have done that, then and then only will our profession be recognized. The next step to advance education was in 1910, when amendments to the By-laws were proposed and in 1911 adopted, providing for the matriculation requirements equivalent to those for admission to recognized high schools, and in 1914 matriculation requirements equivalent to one year of high school work; also a curriculum of not less than three collegiate years of not less than six months each, and beginning in 1913 the curriculum to cover twenty-four months and not less than three collegiate years. In 1912 a backward step was taken providing for a curriculum of twenty-one months, beginning in 1913. In 1915 the curriculum was advanced to a four year course of at least twenty-eight months to take effect in 1916.

The veterinary colleges which adopted the high school course for entrance some years ago report that the attendance immediately dropped but that within a few years it increased to a point beyond anything reached in the previous history of the institutions. The claim, therefore, that the high school entrance requirement will produce a shortage of veterinarians, or that it will permanently cripple the schools, is unfounded.

I am firmly convinced that we have thrown away enough time and to be consistent our minimum preliminary requirement should be the completion of a recognized standard high school covering four years or the equivalent thereof, which includes at least fifteen units, and in addition all veterinary schools should adopt a four year graded course of nine months each year. The higher requirements are necessary to the young men who enter our schools, to the profession and to the community.

I hope we are going to see that from now on there will be but one standard of veterinary education on this continent and that, the best.

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#### VIRGINIA VETERINARY MEDICAL ASSOCIATION

The Virginia Veterinary Medical Association held one of its best meetings in Norfolk, July 13th. The program was especially good. Dr. H. K. Wright of the H. K. Mulford Co., and Dr. T. M. Owen of the B. A. I., gave splendid papers on the preparation and administration of anti-hog cholera serum. Dr. H. S. Willis of Gordonsville gave a splendid paper on milk fever. Dr. E. P. Yeager gave a good paper on tick eradication. These subjects were all discussed by the members of the association. The president's address on the younger veterinarian as affiliated with the state association was timely. The association adjourned to meet in Richmond January 13-14.

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W. G. CHRISMAN, Secretary.

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#### SAN JOAQUIN VALLEY VETERINARY MEDICAL ASSOCIATION

On July 11th the veterinarians of the San Joaquin Valley of California gathered in Fresno and organized the San Joaquin Valley Veterinary Medical Association which will be an auxiliary to the State Association.

It was agreed to meet in Fresno on the evening of every sec-



ond Wednesday of each month, except at such times as it would interfere with the State Association meetings, at which time the meetings would be dispensed with.

The territory involved contains about fifty (50) veterinarians.

The following officers were elected:—President, Dr. John J. McKenna, Fresno; Vice-President, Dr. L. A. Danielson, Madera; Secretary and Treasurer, Dr. Jos. M. Arburua, Hanford.

JOSEPH M. ARBURUA, Sec.-Treas.

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### GENESEE VALLEY VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Genesee Valley Veterinary Medical Association was held at Dr. H. S. Beebe's infirmary at Albion, N. Y., on Wednesday, July 25th, 1917. Twenty members of the association and ten visiting veterinarians were present. A very interesting clinic was held in the morning. Dr. J. N. Frost of Ithaca operated on a variety of cases.

Lunch was served at the Elks' Club Rooms after which Dr. F. E. McClelland read a paper on Serum and Antitoxins; Dr. Joseph Wilder on Ridgling Castration; Dr. W. G. Dødds on Shipping Fever; and Dr. F. E. Cleaver on Some Changes in the Agricultural law.

Each of the papers brought out interesting discussions. Three new members were elected. The next meeting of the association will be held during the second week of January at Rochester, N. Y.

J. H. TAYLOR, Secretary.

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### SOUTH DAKOTA VETERINARY MEDICAL ASSOCIATION

MID-SUMMER MEETING. The South Dakota Veterinary Medical Association held one of the best and most instructive meetings in the history of the organization. On July 17th, at 1:30 P. M. the meeting was called to order by President Dr. H. A. Harwich at the Bond Place on the the south shore of beautiful Lake Kampeska with about thirty members and a number of visitors present.

The first number on the program was the address of welcome delivered by Col. Lee Stover of Watertown. Col. Stover obtained his military rank in the Philippine war and has since that time been engaged in the practice of law and agricultural pursuits. He is, at present, President of the Watertown Water Co., being en-

gaged in the raising of live stock at the present time, Mr. Stover was in a position to give the veterinarians of this State a very interesting and instructive talk.

The next number was an address given by Dr. C. C. Lipp, Head of the Veterinary Department of the State College. Dr. Lipp chose for his subject, South Dakota's Animal Health Laboratory and in an interesting manner gave us an idea of what the State will have and what it will be in a position to do for the live stock interests of the State when the new laboratory now under construction is finished. Dr. Lipp is a very interesting speaker and his address was very much appreciated.

The next number was an address by Dr. John Dinwoodie of the Extension Division of the Veterinary Department of the State College. Co-operation between County Agents and Veterinarians was his subject and the Doctor brought out some very interesting points showing the vital interest to the live stock industry of the State through our co-operation.

President Hartwich went over the numbers generally and gave us a very interesting but brief talk. After this the members and visitors, including the ladies, repaired to the lawn where a delicious banquet was served. When dinner was over the Launch "Stella Mae" was waiting for us and all enjoyed an hour and a half ride around the lake, after which all went by auto to the Council Chamber of the City Hall where we enjoyed the pleasure of listening to an illustrated lecture on the Pathology of Contagious Abortion in Cattle, given by Dr. W. L. Boyd, Head of the Veterinary Department of the University of Minnesota. Dr. Boyd's lecture was indeed a rare treat to the veterinarians of South Dakota and embraced one of the most interesting subjects facing the profession to-day. Dr. Boyd very kindly answered a number of questions following his lecture.

Wednesday morning's session was given over to business matters, the most important of which was the rescinding of the Mitchell Resolution which will permit members of this association to take out state deputyships and maintain their membership in the association. Many new veterinarians coming into the State in the past four years have been unable to be elected to membership on account of their holding deputyships which they were urged to accept at the time they took the state board examinations. Several new veterinarians were elected and others will join as soon as they are aware that the opportunity awaits them.

The afternoon was taken up with the clinic at Dr. Allen's veterinary hospital. Dr. J. P. Foster, former state veterinarian, demonstrated a new idea in spaying puppies through a very small incision without putting a finger into the abdomen. This operation would be very practical in operating on young puppies.

Dr. W. L. Boyd gave us a practical demonstration on the Treatment of Sterility in Cattle, subject being a pure-bred Holstein cow barren for two years. To a great many of us sterility work is entirely new and this demonstration proved very instructive as given to us in Dr. Boyd's congenial manner.

Dr. T. H. Hicks, former state veterinarian and probably the most expert ridgling operator in the northwest, demonstrated the ridgling operation; subject, four-year-old draft colt, right testicle in abdomen. The operation was performed in forty-five (45) seconds. Animal made an uneventful recovery.

After the clinic the meeting was adjourned. Every one present expressed themselves much pleased with the meeting and the pleasant stay at Watertown and at the lake. Our annual meeting will be held at Sioux Falls, January 15th, 16th, 1918.

S. W. ALLEN, Secretary-Treasurer.

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## COMMUNICATIONS

### GREETING FROM FRANCE

ALFORT, LE 24 Juillet, 1917.

Mon cher et honoré Confrère:

Le Conseil des Professeurs de l'Ecole Nationale Vétérinaire d'Alfort m'a confié l'agréable mission de traduire à nos confrères des Etats Unis du Nord-Amérique, par l'intermédiaire de l'Americain Veterinary Medical Association, l'expression des sentiments de cordial attachement et de vive admiration qui le lient à votre grand et noble pays.

Avec la France entière inébranlée et consciente de ses devoirs comme de ses droits, nous tressaillons de joie et de fierté à voir votre grand peuple nous apporter l'inappréciable appui de son concours moral, de sa pensée et de sa puissance.

Il est des phrases qui à elles seules conquerraient tout un peuple. Le "Lafayette nous voilà!" jeté le 4 Juillet sur la tombe du grand soldat par l'un de vos chefs les plus éminents, a fait tressaillir la France.

Des liens indissolubles attachaient l'une à l'autre nos démocraties. Voici nos coeurs intimement liés et nous voulons vous

donner l'assurance de la pérennité de ces sentiments, dont chaque citoyen des Etats Unis appréciera la vigueur et la sincérité en touchant le sol de France.

Veillez agréer, mon cher et très honoré Confrère, l'expression de mon cordial dévouement.

H. VALLÉE,  
Président du Conseil des Professeurs,  
Directeur de l'Ecole d'Alfort.

#### TRANSLATION

My dear and honored Colleague:

The Council of Professors of the National Veterinary School of Alfort has intrusted to me the pleasing task of transmitting to our colleagues of the United States of North America, through the medium of the American Veterinary Medical Association, an expression of the feeling of cordial attachment and deep admiration which binds it to your great and noble country.

With all France firm and united, fully realizing her duties as well as her rights, we are moved with joy and pride to witness your great people bringing to us their inestimable support, their moral alliance, their profound convictions and their great might.

There are phrases which alone win a nation: Such an one—"Lafayette nous voila"! (Here we are!)—spoken at the tomb of the great soldier by one of your greatest leaders, deeply moved all France.

Ties which cannot be broken bind our democracies one to the other: and now our hearts are intimately joined and we wish to assure you of the never ceasing constancy of these sentiments, whose firmness and sincerity every citizen of the United States will at once appreciate upon landing in France.

Receive, my dear and honored colleague, this expression of our cordial devotion.

H. VALLÉE,  
President of Council of Professors  
Director of the School of Alfort.

#### NEW VETERINARY HOSPITAL IN THE PHILIPPINES

*Editor Journal of the American Veterinary Medical Association,  
Ithaca, N. Y.*

Dear Sir: Nearly one-third of the Veterinarians of the Army have served at Camp Stotsenberg, Pampanga, Philippine Islands, at one time or another and will remember the old nepa building used as a Veterinary Hospital; and in consequence they will probably be interested to learn that at last, after years of effort, a new hospital has been secured.

The old building accommodated eight head of stock and the auxiliary nepa shed twelve more. These will be retained for use as long as they remain in repair.

The new building is of reinforced concrete throughout and has, besides, ten box and twenty single stalls, the offices, store-rooms, dispensary and operating room. Although it could be improved in many ways and might not please everyone it is a vast improvement over the old conditions.

This building was designed by Mr. T. W. Matsdario, the post



1. The Old Veterinary Hospital, Stocks and Dressing Floor.  
Camp Stotsenberg, P. I.



2. The New Reinforced Concrete Veterinary Hospital at Camp Stotsenberg,  
P. I.—The old building in the rear.

engineer, assisted by suggestions made by veterinarians Gould and Foster.

Dr. R. J. Foster has the care of the animals of the 9th Cavalry, numbering 1240, and Dr. J. H. Gould has the six batteries, four pack trains and headquarters company of the 2d Field Artillery, animals numbering 1040, in charge.

(Signed) N. S.



## MISCELLANEOUS

—Dr. J. T. Purcell has removed from Rapid City, S. D., to Lincoln, Neb.

—The marriage of Miss Lola Margaret Marriott to Dr. Erwin Veranus Moore of Ithaca, N. Y., occurred August 21.

—Dr. L. A. Merillat of Chicago will conduct the course of surgery at the Kansas City Veterinary College after the holidays.

—The wedding of Miss Minnie Harris of Coshocton, Ohio and Dr. A. Slawson of New York is announced. They will be "at home" in New York City after October 1.

—Dr. Warren B. Earl has been transferred from Kansas City, Kans. to the serum inspection work at the Mulford Laboratories at Glenolden, Pa.

—At the forty-third annual meeting of the Ontario Veterinary Association at Toronto, Canada, steps were taken to urge the provincial government to take action in the matter of protecting the profession from unqualified practitioners, and to encourage young men to enter the profession. Dr. C. S. McDonald of Toronto was re-elected president, Dr. H. E. Hurd of Toronto was elected secretary-treasurer.

—Dr. Alex. Plummer has removed from Los Angeles to 1140 Sutter St., San Francisco, Cal.

—AN IMPORTANT DECISION ON POTENCY STANDARDS FOR SERUMS. An Iowa law makes it the duty of the director of the State chemical laboratory to "establish and declare the standard degree of potency of hog cholera serum for successfully treating, curbing and controlling hog cholera." Sale of serums failing to come up to such standard is made unlawful. As a purported compliance with this law, the director of the laboratory adopted the following requirement: "The dose, which shall be stated on the label, must be sufficient to prevent a susceptible hog of the weight the dose is recommended for, from showing symptoms of hog cholera when injected hypodermically with two cubic centimeters of virulent blood, which will produce hog cholera in susceptible hogs of the same weight within eight days after being inoculated with the same quantity of virulent blood." In the recent case of Hollingsworth vs. Midwest Serum Co. (162 Northwestern Reporter, 620) the Iowa Supreme Court denies the right of plaintiff to recover

damages claimed to have resulted from defendant's sale of serum not conforming to the standard fixed by the director of the State laboratory; the decision being based on a view taken by the court that the director's regulation is not responsive to the law under which it purports to have been adopted, in that the law contemplates a standard test applicable before sale of serum, whereas the director's test applies to results to be obtained by the buyers. This discrepancy in the time as of which the test shall be made is found to be material in view of the undisputed fact that such serums deteriorate rapidly.

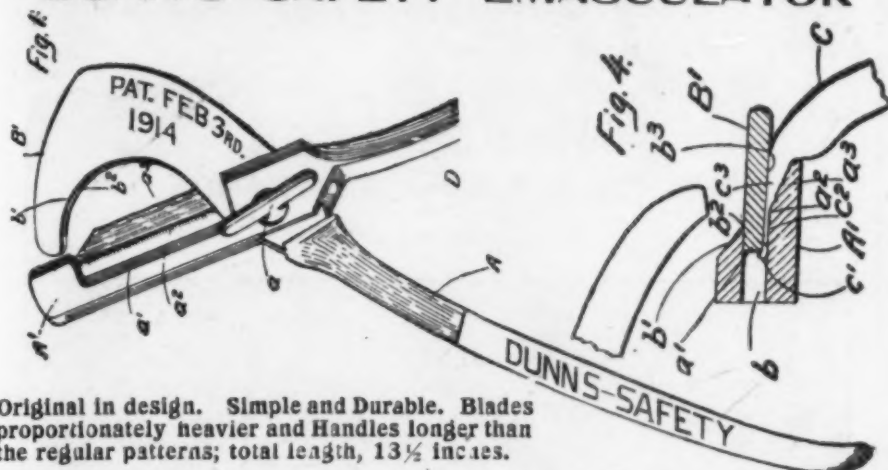
"If the director of the laboratory had prescribed some definite test which should be conformed to by the producer before he should market his serum," said the Supreme Court, "it would doubtless have been fairly responsive to the statute, and, perhaps, the only compliance therewith possible. We are satisfied, however, that no power is conferred upon the director to declare that ultimate results in the use of the serum shall be conclusive upon the producer or render him subject to prosecution notwithstanding that the serum met the legal test at and before its marketing. The statute does not make the producer a warrantor of results, nor does it authorize the director to make him such. This view is emphasized by the further consideration that the serum when completed is subject to rapid deterioration, and has need to be kept with great care under seal and refrigeration. We are of the opinion, therefore, that the declaration of the director was not responsive to the statute, and was not warranted thereby. The criterion which the director is authorized to declare must be applied as of the time at or before the marketing of the serum and not after marketing."

The result of this holding is that there was no violation of the Iowa statute. As additional points affecting plaintiff's right to recover, the court holds that the burden was on him to show that the defendant negligently failed to furnish reasonably effective serum, and that the evidence was insufficient to establish such negligence.

—*Druggists Circular*.

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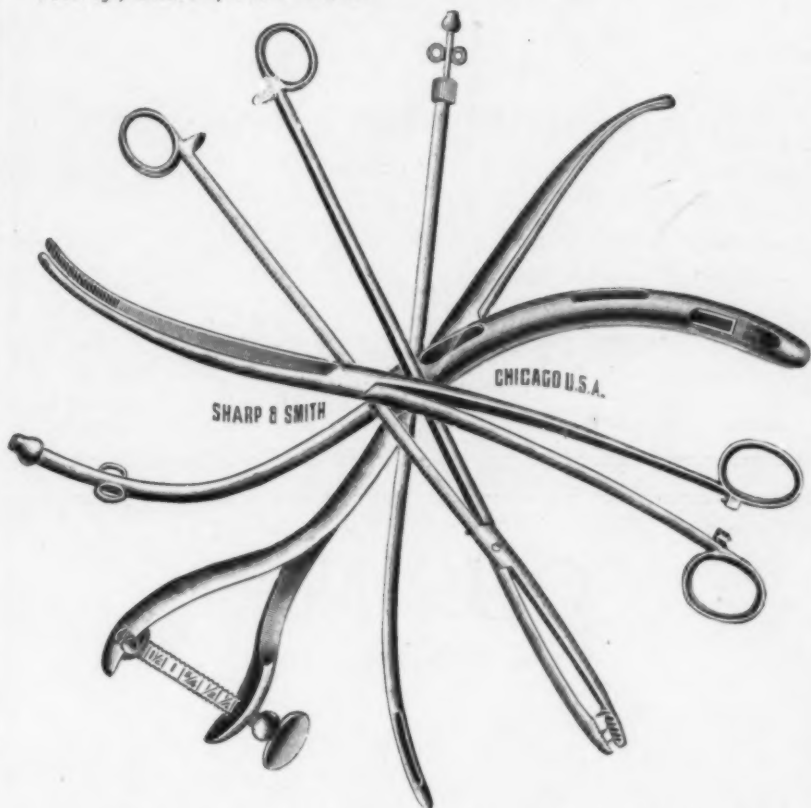
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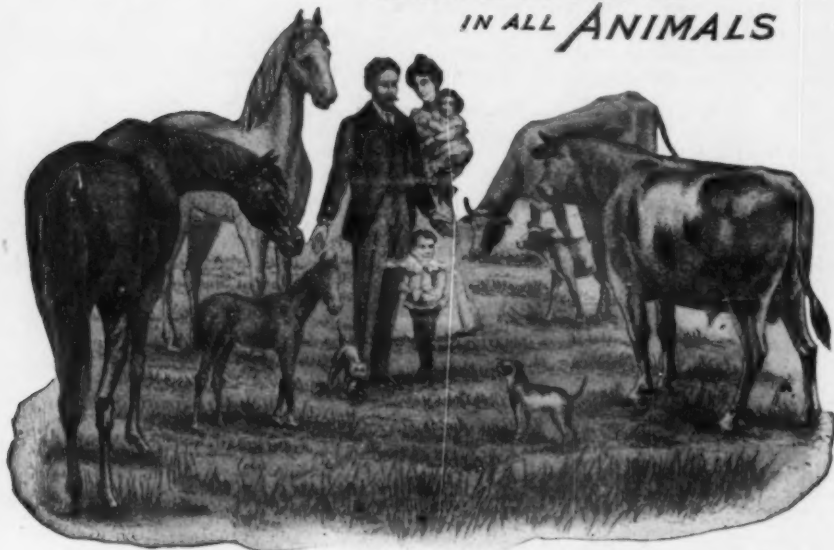
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Streptococcus Vaccine  
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## VETERINARY MEDICAL ASSOCIATION MEETINGS

In the accompanying table the data given is reported by many Secretaries as being of great value to their Association, and it is to be regretted that some neglect to inform us of the dates and places of their meetings.

Secretaries are earnestly requested to see that their organizations are properly included in the following list:

Name of Organization	Date of Next Meeting	Place of Meeting	Name and Address of Sec'y
Alabama Vet. Med. Ass'n..	.....	.....	C. A. Cary, Auburn
Alumni Ass'n College of Vet. Med. O. S. U.....	.....	Columbus.....	W. R. Hobbs, care O. S. U., Columbus, Ohio.
Alumni Ass'n, N. Y.-A. V. C.	.....	141 W. 54th St.	Jos. A. DeGroodt, Mendham, N. J.
Alumni Ass'n U. S. Coll. Vet. Surgeons	April 14, 1917	Wash., D. C....	C. M. Mansfield, Wash., D. C.
American V. M. Ass'n....	August, 1917 ..	Kans. City, Mo.	L. A. Merillat, 1827 Wabash Ave., Chicago, Ill.
Arkansas Veterinary Ass'n..	.....	.....	R. M. Gow, Little Rock
B. A. I. Vet. In. A., S. Omaha	3d Mon. each mo.	S. Omaha, Neb..	J. V. Giffe, So. Side, Omaha
British Columbia Vet. Ass'n	.....	.....	K. Chester, White Rock, B. C.
Buchanan Co. Vet. Ass'n...	Monthly .....	St. Joseph.....	F. W. Caldwell, St. Joseph, Mo.
California State V. M. Ass'n	.....	.....	F. M. Hayes, Davis.
Central Canada V. Ass'n....	3d. wk. Jan. '18	Ottawa .....	A. B. Wickware, Ottawa
Central N. Y. Vet. Med. Ass'n	June and Nov..	Syracuse.....	W. B. Switzer, Oswego.
Chicago Vet. Society.....	2d Tu. each mo.	Chicago .....	A. A. Leibold, Chicago
Colorado State V. M. Ass'n.	May 31, June 1	Fort Collins ..	I. E. Newsom, Ft. Collins.
Connecticut V. M. Ass'n....	.....	.....	A. T. Gilyard, Waterbury.
Delaware State Vet. Society.	Jan. Ap. Jul. Oct.	Wilmington ...	A. S. Houchin, Newark, Del.
Essex Co. (N. J.) V. M. A....	3d Mon. each mo	Newark, N. J....	J. F. Carey, E. Orange, N. J.
Genesee Valley V. M. Ass'n.	.....	Rochester .....	J. H. Taylor, Henrietta, N. Y.
Georgia State V. M. A.....	Sept. 18, 19, '17.	Columbus .....	P. F. Bahnsen, Americus.
Hudson Valley V. M. A....	.....	.....	W. H. Kelly, Albany.
Idaho Ass'n Vet. graduates.	.....	.....	C. V. Williams, Blackfoot
Illmo Vet. Med. Ass'n.....	.....	.....	L. B. Michael, Collinsville, Ill.
Illinois State V. M. Ass'n..	July 18, 19...	East St. Louis.	L. A. Merillat, Chicago.
Indiana Veterinary Ass'n...	Jan, 1918 ....	Indianapolis ..	G. H. Sobers, Indianapolis
Iowa Veterinary Ass'n.....	.....	.....	H. B. Treman, Rockwell City.
Kansas State V. M. Ass'n..	Jan. 1-2-3, 1918	Manhattan .....	J. H. Burt, Manhattan.
Kentucky V. M. Ass'n.....	June 20, 21...	Shelbyville ...	D. E. Westmoreland, Owensboro
Keystone V. M. Ass'n.....	2d Tu. each mo	Philadelphia ...	C. S. Rockwell
Louisiana State V. M. Ass'n.	.....	.....	Hamlet Moore, N. Orleans, La.
Maine Vet. Med. Ass'n....	.....	.....	M. E. Maddocks, Augusta
Maryland State Vet. Society	.....	Baltimore .....	H. H. Counselman, Sec'y.
Massachusetts Vet. Ass'n...	4th Wed. ea. mo.	Young's, Boston	E. A. Cahill, Lowell, Mass.
Michigan State V. M. Ass'n.	.....	.....	W. A. Ewalt, Mt. Clemens.
Minnesota State V. M. Ass'n	.....	.....	G. Ed. Leech, Winona.
Mississippi State V. M. Ass'n	2d Tues. & Wed. Jan. 1918 ..	Meridian .....	E. S. Norton, Greenville.
Mississippi Valley V. M. Ass'n	Semi-Annually	.....	W. L. Hollister, Avon.
Missouri Valley V. Ass'n...	Feb. 14-16, 1917	St. Joseph, Mo.	R. F. Bourne, Kansas City, Mo.
Missouri Vet. Med. Ass'n...	July, 1918 ....	Sedalia, Mo. ...	Chas. D. Folse, Kansas City.
Montana State V. M. A....	Jan., 1918 ....	Great Falls ...	A. D. Knowles, Missoula
Nat'l Ass'n B. A. I. Employees	.....	.....	S. J. Walkley, 185 N. W. Ave., Milwaukee, Wis.
Neb. Vet. Med. Assoc'n.....	.....	.....	S. W. Alford, Lincoln
New York S. V. M. Soc'y...	.....	Brooklyn .....	C. P. Fitch, Ithaca, N. Y.
North Carolina V. M. Ass'n.	June 26, 27...	Charlotte, N. C.	J. P. Spoon, Burlington.
North Dakota V. M. Ass'n..	July 17-18, '17	Fargo, N. D....	W. J. Mulroony, Havana
North-Western Ohio V. M. A.	.....	.....	C. E. Hershey, Tiffin, O.
Ohio State V. M. Ass'n.....	Jan. 10-11, '18	Columbus, O....	F. A. Lambert, care O. S. U., Columbus, Ohio.
Ohio Valley Vet. Med. Ass'n	.....	.....	C. S. Henry, Terre Haute, Ind.
Oklahoma State V. M. Ass'n	.....	.....	R. C. Smith, Enid, Okla.
Oregon. Vet. Med. Ass'n	June, 1917....	Salem .....	B. T. Simms, Corvallis, Ore.
Pennsylvania State V. M. A.	.....	.....	T. E. Munce, Harrisburg
Portland Vet. Med. Ass'n...	4th Tu. each mo.	Portland, Ore..	Sam. B. Foster, Portland, Ore.
S. Carolina Ass'n of Veter'ns	Pending .....	Pending .....	B. K. McInnes, Charleston.
So. Illinois V. M. & Surg. Ass'n	.....	.....	F. Hockman, Iola.



Schuylkill Valley V. M. A...	.....	Reading .....	C. R. Potteiger, Reading
Soc. Vet. Alumni Univ. Penn.	.....	Philadelphia ..	B. T. Woodward, Wash 'n, D. C.
South Dakota V. M. A.....	.....	.....	S. W. Allen, Watertown.
So. Aux. of Cal. S. V. M. Ass'n.	3d Wed., Dec,	Los Angeles....	J. A. Dell, Los Angeles.
Southeastern Michigan Vet.	Mar., June, Sep.	.....	.....
Med. Assn. ....	April 11 .....	Detroit .....	H. Preston Hoskins, Detroit
Southeastern States Vet.	.....	Chattanooga,	.....
Med. Ass'n .....	Dec. 27, 28, '17	Tenn. ....	G. A. Roberts, W. Raleigh, N. C.
Southern Tier V. M. A.....	.....	.....	C. P. Fitch, Ithaca, N. Y.
Southwestern Mich. Vet.	.....	.....	L. A. Winter, Eau Claire,
Med. Ass'n .....	.....	.....	Mich.
Tennessee Vet. Med. Ass'n..	Nov. ....	Columbia .....	F. R. Youree, Lebanon
Texas V. M. Ass'n.....	.....	.....	Allen A. Foster, Dallas.
Twin City V. M. Ass'n.....	2d Thur. each mo	St. P.-Minneap..	M. H. Reynolds, St. Paul.
Utah Vet. Med. Ass'n.....	.....	.....	E. J. Coburn, Brigham City.
Vermont Vet. Med. Ass'n...	July 18-19, '17	St. Johnsbury .	Geo. Stephens, White River
.....	.....	.....	Junction.
Vet. Ass'n of Alberta.....	.....	.....	F. A. McCord, Edmonton, Alta.
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Vet. Ass'n of Manitoba....	Feb. & July ea. yr	Winnipeg .....	Wm. Hilton, Winnipeg.
Vet. Med. Ass'n of N. J.....	.....	.....	E. L. Loblein, N. Brunswick
V. M. Ass'n, New York City.	1st Wed. ea. mo.	141 W. 54th St.	R. S. McKellar, N. Y. City.
Veterin'y Practitioner's Club	Monthly .....	Jersey City....	C. F. O'Dea, Union Hill, N. J.
Virginia State V. M. Ass'n..	July 12, 1917..	Norfolk .....	W. G. Chrisman,
.....	.....	.....	Blacksburg, Va.
Washington State Col. V. M. A.	1st & 3d Fri. eve.	Pullman .....	R. J. Donohue, Pullman.
Washington State V. M. A...	June, 1917 ....	Pullman .....	Carl Cozier, Bellingham.
Washington Vet. Med. Ass'n	Friday each wk.	Wash., D. C....	L. C. Wambaugh, Wash, D. C.
Western N. Y. V. M. A.....	.....	Buffalo .....	F. F. Fehr, Buffalo.
Western Penn. Vet. Club....	3d Tu. each mo.	Pittsburgh ....	Fred Weitzel, Pittsburgh.
Wisconsin Vet. Med. Ass'n...	.....	.....	W. A. Wolcott, Madison.
York Co. (Pa.) V. M. A.....	June, Sept., Dec.	.....	.....
.....	March. ....	York .....	E. S. Busticker, York, Pa.

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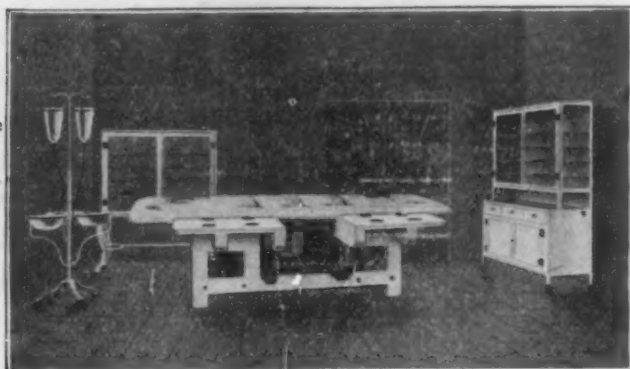
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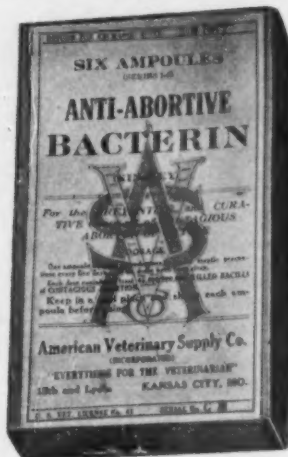
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